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The Herbert Moran Oration.[1]

THE AUSTRALIAN MEDICAL ASSOCIATION.

By A. M. McINTOSH,
Sydney.

HERBERT MICHAEL MORAN, in whose honour this oration was established, was cast in an unusual mould. In particular he displayed a rare versatility in the varied interests which engaged his attention at different periods of his life. He achieved international status in Rugby football. His busy general practice soon became predominantly surgical. In New South Wales, if not in Australia, he pioneered the therapeutic application of radium in malignant disease. He was an ardent student of the literature and culture of France and Italy, and, to a less extent, of Germany, and he strove to develop a like enthusiasm amongst his friends. He served in both World Wars. In the more recent war he acted for a lengthy period as a president of army medical boards, a post for which his native shrewdness and sound judgement made him particularly suitable. He set out his views in a very stimulating criticism of existing schemes of medical examination and classification in the services. In his published works there is much that is controversial and provocative, but they do provide a valuable and candid record, in fluent prose, of his reactions to the various personalities and policies he encountered in a very unusual and interesting life.

I knew him most intimately in his student days, and my most vivid impression of him is of his kindly, generous spirit and his enthusiasm for whichever of his interests claimed him at the moment. I am very appreciative of the honour conferred on me by the College in its invitation to deliver this oration, the scope of which has been decided by Moran's interest in the history of medicine.

In March, 1846, Farquhar McCrae, M.D., at that time an honorary surgeon at the Sydney Infirmary, who is credited with having introduced the stethoscope into use in New South Wales, wrote to the editor of *The Sydney Morning Herald* accusing Dr. William Bland of unethical conduct. Bland, he alleged, having seen a patient in consultation, had subsequently visited her home and informed her husband that McCrae's treatment was harmful and likely to endanger her life. Bland replied through the same channel vehemently denying the accusation. The acrimonious discussion continued for some weeks, and in the end each party published and circulated widely a pamphlet setting out the facts as he saw them. Honours were about even and neither the parties involved nor the profession at large gained in prestige by the argument. However reprehensible this appears, to the participants it no doubt seemed a quite normal procedure, as no standard of medical ethics had yet been formulated in the colony, nor was there any organized professional body to arbitrate in these matters. There was not even a medical journal in which the facts might be disclosed, for the short-lived *Australian Medical Journal* was not published until August of the same year.[1] Similarly, when Mr. Charles Nathan, senior

[1] Delivered at a meeting of the Royal Australasian College of Surgeons, Sydney, on December 6, 1950.

[1] This journal must not be confused with the journal of the same name first published in Victoria ten years later and destined to have a much longer life. The first number, which appeared on August 1, 1846, was edited by George Brooks, the Senior Colonial Surgeon. In December, 1846, he was succeeded by Isaac Aaron, who functioned until September, 1847, when publication ceased, partly because of increase in his professional engagements, but principally because of want of support from members of the profession. A note in Volume I, Number 1, points out that a thousand copies of the first number in the new form will be distributed gratuitously. There is reference also to changes and alterations in the new publication, all of which suggest some other earlier journal. A note from S. T. Knaggs in the final number of *The Australian Practitioner* refers to his as the fourth unsuccessful attempt to establish a medical journal in Sydney. We are, however, aware of three only. It seems that further research may discover a medical journal published in Sydney prior to 1846.

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surgeon to the Sydney Infirmary, became aware of a new anæsthetic and convinced himself of its extraordinary value, it did not seem to him, a man of highest probity, inconsistent with the best ethical standards that he should use the columns of the daily Press to give the widest publicity to this innovation. On June 15, 1847, he wrote to *The Sydney Morning Herald* in these terms:

> It having been asserted, and by some persons believed, that the inhalation of ether vapour is dangerous and that the surgeon who permits its use is careless of the welfare of his patient, allow me through your columns to state that I have within the past few days witnessed nearly 40 painless operations from it, having myself inhaled before I experimented on anyone, and in no instance did any mischief or even unpleasantness follow.

This was a reference to the first ether anæsthetics given in Sydney in 1847 at the surgery of John Belisario, D.D.S., in Spring Street, Sydney. Press representatives, who had been invited to witness some of these administrations, wrote enthusiastically of this wonderful procedure. The editor of the *Australian Medical Journal*, however, would have none of it. Possibly piqued because his journal had not been the avenue for publicizing this remarkable discovery, he devoted to it articles full of scathing criticism. "Few practitioners", he wrote,[1] "would willingly, if they could avoid it, operate on a patient dead drunk from liquor, yet here we find it seriously proposed to make him drunk previous to the operation. We have no hesitation in predicting for this process a transient popularity. It will have its day, ultimately to be abandoned as useless and injurious"; and again,[2] after reporting some fatalities during administration of ether, "we must then conclude that the avidity with which it has been adopted by the profession, without some examination of its modus operandi, is anything but creditable to their judgment and that the cases in which no bad results have followed are rather lucky escapes from empirical rashness than the legitimate effects of rational investigation and experiment". He was not, however, entirely consistent, as he published in the same issue as the foregoing, advertisements from dentists whose main appeal was that they used the new anæsthetic, and also from vendors of an apparatus for its administration. The introduction of ether anæsthesia to New South Wales came at a very opportune time, as the Sydney Dispensary moved into the south wing of the Macquarie Street Hospital in 1845 and into the central wing in 1848, and became the Sydney Dispensary and Infirmary. It was here in 1852 that chloroform was administered for the first time in New South Wales by Dr. H. G. Alleyne for amputation of a leg. At first the use of these anæsthetics was restricted to dental extractions, incision of abscesses and similar minor procedures. An occasional fatality caused a temporary waning of popularity, but with increasing experience most operations were carried out under anæsthesia and the range of operative procedures was widely extended. Surgery in pre-anæsthetic days was limited by the daring of the surgeon and the fortitude of the patient. Before the Infirmary was opened, surgery, apart from that carried out at the Convict Hospital, was done mainly at the Benevolent Asylum by William Bland and his associates. In 1825 he had been asked to submit recommendations for additions to the asylum buildings. One of the suggestions[3] was:

> A dead room, this to be furnished with a strong plain table about seven feet long and three broad; also with a strong plain wooden slab attached (that it might occupy less space) to the wall of the room so that when not used it may be let down: the table and slab for the purposes of dissection. This room should if possible be well lighted from the top by means of a sky light. Thus constructed and furnished the room could be convertible when required into an operation room for the purposes of which the table would be equally appropriate and useful.

These alterations were not completed until 1832, in which year Bland operated in this morgue on John Mullen, aged twenty-nine years, who had an aneurysm of the subclavian artery, and tied the innominate artery. The patient did well for a few days and on the sixth day was even able to leave his bed. Thereafter various complications arose, with secondary hæmorrhage, and he died on the eighteenth day. The after-treatment consisted of sedation and "reducing", and included venesection with the removal of 157·5 ounces, but Bland[4] in his review of the case says:

> The fatal result I attribute partly perhaps to the somewhat diseased state of the artery, but still more to a want of decision on the fourteenth and fifteenth days after the operation in not having bled with a more liberal hand.

There is record of a similar operation in 1838 that required five and a half hours to complete, and the annual reports of the Benevolent Society show numerous ligations of femoral and common iliac arteries, of amputations, lithotomies and removal of tumours, in addition to minor operations. Most of Bland's best and most adventurous surgery was done in the pre-anæsthetic days. He was one of the founders and a life member of the Sydney Dispensary, but took little part in its activities after the move to Macquarie Street, when it became the Sydney Infirmary. He retained his association with the Benevolent Asylum until 1863. As to his results, the Benevolent Society proudly reports[5] in 1846:

> All the above operations were performed with success and no death has occurred from any operation performed in the institution for the last four or five years, and only two or three deaths have taken place during the past thirteen years after surgical operations and that from causes which neither medicine nor medical assistance could prevent.

Bland's active participation in public affairs and his association with the development of the colony tend to overshadow his professional achievements, but he seems to have established a standard of surgery in New South Wales comparable with that found anywhere else in the world.

The 1850's were exciting years in the Australian colonies. In 1851 Victoria became an independent colony, Queensland in 1859. In 1851 also gold had been discovered, with a resulting tremendous influx of immigrants. In six years the population of the colonies had more than doubled. Many of these newcomers were of an undesirable type, crime increased apace, there were rioting and bloodshed. Many medical men were included in this throng and some of them did not measure up to the best accepted standards. There was an influx, too, of ignorant and unprincipled charlatans ready to take full advantage of the licence permitted them by the legislation of the day. The University of Sydney had been established in 1850 and it was hoped that a medical school would soon be an accomplished fact. Meantime any local youths desiring to graduate in medicine had to proceed overseas, although from 1849 onwards students were admitted to the Infirmary and if they received certificates of hospital attendance and proficiency in pharmacy, were given two years' credit in the period of clinical attendance required of candidates for examination at the College of Surgeons of England. Frederick Milford, who went to England in 1852, was the pioneer of this school. It had been one of the objects of the Dispensary to "form the nucleus and commencement of a medical school where the rising youth of the colony could acquire a knowledge both of the structure and diseases of the human frame". This object was kept in mind, and after the move to the Infirmary in Macquarie Street discussions were held with the representatives of the University senate from 1859 onwards. These discussions produced no useful result. Although there was no medical school, it was possible to acquire a medical degree at the University of Sydney. A medical faculty was set up of eight examiners, with the professor of physics as the dean. It was required of candidates that they must already possess the degree of B.A. (they could be exempted if they had been in practice for ten years). They must have proof of four years' study at an approved medical school and of eighteen months in a hospital of more than eighty beds before they were allowed to take the examination.

Hospital accommodation in Sydney was quite inadequate. In 1855 there was room at the Infirmary for 130 patients; there were frequently 150 inmates. The beds in the Benevolent Asylum were gradually being restricted to

women, with a few for children. Saint Vincent's Hospital first received out-patients in August, 1857. A ward for women was opened later in the same year, and one for men in the year following. At first only twenty beds were available, but these were soon increased to forty. The overcrowding was made worse by the retention in beds intended for acute cases, of patients suffering from chronic diseases, who should have been sent to more appropriate institutions.

Since the failure of the *Australian Medical Journal* in 1847 there was no medical journal available for the dissemination of recent advances in medical knowledge, nor was there in New South Wales any scientific society where medical problems might be discussed. Isaac Aaron, the newly appointed health officer to the city, and William Bland had in fact read papers on sanitary reform before the New South Wales Philosophical Society, which papers were subsequently published in the *New South Wales Magazine of Science and Arts* in 1856-1857. But the range of medical subjects which could be discussed before that society was distinctly limited. No doubt small groups and coteries did talk over their mutual problems, but there was no organization like the Medical Society of Victoria, formed in 1852, to provide an opportunity to improve cohesion and cooperation in the profession, to raise the standard of practice, and to offer a united front to the influences which increasingly threatened its stability. It was with these objects in view that in 1859 the Australian Medical Association was formed. The initiative in the formation of the association was taken by Dr. James Robertson, a kindly, devout surgeon practising in Wynyard Square, of whom it was written some years after his death, "during his lifetime by his high intellectual and moral status and his efforts to benefit the profession he perhaps effected a greater amount of good to it than any other practitioner in this colony whom we can recall". In November, 1858, he issued a circular to his medical friends in and around Sydney, inviting them to cooperate in the foundation of a society with the object of "the promotion of mutual respect and good fellowship amongst the members of the profession: the consideration of such matters as would lead to the general advancement of it: and for the collection of a benevolent fund for the use of poor and sick fellows, their widows and orphans". "There have been", he continued, "obstacles to the formation of an association, but I venture to hope that if the preliminary difficulty of having a few meetings experimentally can be got over, that a society may be formed in Sydney in such a manner as to ensure unity of action and permanence. With this in view I propose to ask many of my professional brethren to a few conversational meetings at my house, hoping that out of these will arise the much-to-be-wished-for society. All to whom I have mentioned the object, agree as to its desirability; most have promised to assist in the formation and carrying on of it, and several have kindly undertaken to read papers at the preliminary meetings at my house." The first conversazione was held on November 15, 1858; forty practitioners were present, and Dr. A. M. A'Beckett, who was associated with Bland as a surgeon to the Benevolent Society, read a paper on scarlatina. At the second meeting Mr. Charles Nathan discussed "Fracture of the Thigh", and it was decided that the formation of an association was desirable and that immediate consideration should be given to the mode in which such association should be formed. Enrolment of members was commenced and a subcommittee was appointed to frame the "Laws of the Association", which with slight amendments were adopted subsequently. On February 28, 1859, the first meeting of the Australian Medical Association was held in the Chamber of Commerce at the Exchange. The Honourable William Bland was elected president, the Honourable James MacFarlane vice-president, Dr. Bartholomew O'Brien treasurer, Dr. James Robertson secretary. The trustees were Robertson, O'Brien and Nathan. The list of original members—87 in all—was declared to be closed. The chairman at this meeting was A. M. A'Beckett. He was not elected to any office because of his impending departure for England. One of the laws of the association provided that distinguished members of the profession not resident in New South Wales might be elected honorary fellows, and A'Beckett was honoured by the first such appointment.[1] The fact that many of the Fellows resided in the country—some in fact in Queensland—was one reason for the disparity between the membership of the association and the actual attendance at its meetings. This had apparently been to some extent anticipated, for whilst every member received at the commencement of each year a syllabus of the meetings during the year, only those within five miles of Sydney received a regular monthly notice. The laws relating to finance are, in the light of subsequent happenings, of particular importance.

> The cash of the Association shall belong to: (*a*) A General Fund (of all money not specifically stated to belong to the Benevolent Fund) for the ordinary purposes of the Association. (*b*) A Benevolent Fund for rendering pecuniary aid to those in distress who are or have been Fellows of the Association, their widows and orphans. Each Fellow residing in, or within five miles of, Sydney shall pay to the General Fund two guineas annually in advance. Subscription, in addition, to the Benevolent Fund shall be optional. Each Fellow not residing within five miles of Sydney shall pay to the Benevolent Fund a subscription of not less than one guinea annually in advance.

The association met at the Australian Subscription Library, later the Free Public Library, at the corner of Bent and Macquarie Streets. Meetings were held monthly, commencing at 8 p.m. and terminating at 10 p.m. If the general business of the association was not completed in the first half-hour, it was adjourned until after the paper of the evening was read; this also was limited to half an hour.

At first the meetings were well attended, the papers read covered a wide range and were well discussed. The association received official recognition; the Colonial Secretary sent them reports on vaccination and other similar documents received from the Imperial Government; they attended the Governor's levee as a body headed by the president.

Dr. Henry Grattan Douglass submitted for their comment a medical Bill he proposed to introduce into the Legislative Council.[2] It was decided that the Bill would, with minor amendments, be quite acceptable. It was, however, so greatly changed by the Council that there were no regrets when it was dropped.

The council of the association drew up and circulated a "Code of Ethics" based on that adopted by the American Medical Association. The necessity for some such guidance and the urgent need for some body to advise and arbitrate in these matters are indicated by the numerous disputes which the association or its representatives were invited to decide. Their decisions were not invariably well received. At this early stage, and on several occasions in succeeding years, the question of publication of the association's proceedings, and particularly of papers read before it, was discussed, but action was invariably deferred, mainly because of the cost. That some such provision was necessary was shown repeatedly. Even in its first year there was trouble on this account. In August, 1859, Dr. J. Berncastle read a paper on dysentery, which was published *in extenso* in *The Sydney Morning Herald* next morning. It dealt mainly with the diagnosis and treatment of the condition, and it assumes a knowledge of anatomy, therapeutics and medical terminology which the lay reader would be unlikely to possess.

[1] A'Beckett had taken an active interest in the general life of the community, was a member of the first Legislative Council and examiner of the Medical Faculty. He returned to Sydney a few years later, but did not participate in the affairs of the Association, which was then rapidly declining. He died at Ashfield in 1871.

[2] H. G. Douglass has received less credit than his due for his persistent efforts in advancing higher education in New South Wales. He is the first person of whom it is recorded that he took a step ultimately leading to the foundation of the university. He was a friend of W. C. Wentworth, to whom he imparted some of his enthusiasm. "Dr. Douglass moved Mr. Wentworth, Mr. Wentworth moved the Legislature, and Dr. Nicholson moved heaven and earth." ("Old Times", 1903; quoted by Dr. K. Macarthur Brown, "Medical Practice in Old Parramatta".)

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> I have confined myself to the causes and treatment of the disease in a purely practical point of view which will make up in usefulness what this hastily written paper lacks in brilliancy or elaborate theories. I began it on Saturday afternoon at 4 and finished it at 10, writing from memory currente calamo. Perhaps the paper is no worse on that account as the practical experience of men is more valuable on such occasions than prosy and elaborate dissertations which books will more readily supply.

The association held a special meeting at which, in spite of vigorous protests from the author, it passed a resolution regretting his action. It was further resolved that:

> No Fellow shall publish in a non-professional publication any paper which may be read before the Association, without the special sanction, or at the request of, the Association.

Berncastle resigned soon after this happening.

One partial solution of the problem was suggested by the editor of the *Australian Medical Journal*, established in Victoria in 1856. He wrote welcoming the association and inviting its members to contribute to his journal. The response to his invitation was limited almost entirely to papers by William Bland, which appeared in Volumes V and VI of the journal. In 1859 he wrote "Treatment of Dislocations", in which he was specially interested. The method recommended consisted in brief of steady, intermittent extension by pulleys for periods up to three weeks. Anæsthesia was not employed as "by blunting sensibility it would deprive the operator of a guide as to the direction in which extension should be applied". Pain caused by extension was said to be minimal and results attained, in spite of long delay in commencing treatment, were almost invariably satisfactory. "Bites of Venomous Snakes" (1860) discusses treatment on orthodox lines; a similar paper had been contributed to *The Lancet*. "Sanitary Reform" (1861) deals with local problems of town planning, sewage disposal, water supply and harbour pollution; the same subject had been discussed earlier in greater detail before the Philosophical Society of New South Wales. Many of the members were provoked by the refusal of insurance companies to pay a fee for reports from private medical attendants of candidates for insurance. The association discussed the matter at length with the companies concerned, but no action was taken. The first year ended with a membership of 111, and the association received congratulations on its "remarkable success". An amount of £41 19s. 6d. to the credit of the general fund was transferred to the benevolent fund. The secretary published a very useful "Medical Directory", which notified names and locations of 230 registered practitioners. Also included were a sketch of the formation of the Australian Medical Association, with its first annual report, and a note on the Australian Medical Library. A list of medical appointments under Government and information regarding hospitals and other public institutions and charities were also supplied.

One of the laws of the association debarred any fellow from occupying the position of president for two successive years. At the end of the first year Bland was succeeded as president by John MacFarlane. MacFarlane, an M.D. of Glasgow, was an honorary physician to the Sydney Infirmary and had recently been appointed to the Legislative Council. A man of distinguished presence, he was noted for his wide culture, public spirit and philanthropy—altogether a worthy successor to William Bland. Interest in the meetings was still well maintained and there was never any difficulty in securing papers for discussion. In 1846 there had been established the Australian Medical Subscription Library, of which John MacFarlane was secretary. Fees payable were £5 5s. for admission and first year's subscription, and thereafter £2 2s. *per annum*. New books were purchased as funds accrued and members were allowed to nominate books for purchase. Its catalogue in 1855 contained over 200 volumes and numerous journals. Support for it was, however, beginning to wane, and presumably on this account Dr. O'Brien moved in April, 1860:

> That a Committee consisting of Mr. Aaron, Mr. Nathan and the mover be appointed to submit to the Australian Medical Library the following proposal, viz., that in the event of members of the Australian Medical Library giving over the Library to the Association that body will bind itself to lay out not less than £30 a year in books to be added to the Library, and should the Association fail to fulfil this arrangement any time before the termination of 10 years, all the books are to revert to the Australian Medical Library.

There is no further reference to this matter in the minutes of the association, but the library and the association seem to have terminated almost simultaneously.

There was some discussion as to whether the association should obtain an Act of Incorporation, but it was decided that, however desirable this might be, the legal costs were too great for the suggestion to be entertained for the time being. The first claim was made on the benevolent fund in 1860 by the widow of a deceased Fellow, and some assistance was also given by private subscription to a distressed practitioner who was not a Fellow of the association.

In 1861 Bland was again president. Robertson, to whose efforts the formation of the association was due, declined office for health reasons, and Dr. F. Boyd was appointed secretary in his stead. He, however, soon resigned from the association, having taken umbrage when its council declined to investigate a charge made against him by a non-member. There were numerous other important defections, including O'Brien and Charles Nathan, both of whom were trustees. There is in the minutes no hint of any disaffection great enough to be the cause of these resignations, which had a very serious effect not only on the numerical strength of the association, but inevitably also on its prestige. Attendances at the monthly meetings diminished greatly and thereafter the names of the Fellows present were detailed in the minutes. At the July meeting Dr. L. Foucart read a paper on imperforate anus, of which a short account appeared in the *Empire* newspaper shortly thereafter. "Dr. Foucart", we read, "described very minutely a case of this description which had come under his notice. He claimed that this was the third case recorded of operation and formation of an artificial anus. (The earlier cases had been reported from Bath and Brest respectively.) In the present instance four medical gentlemen had given up the case as hopeless and, considering that death must necessarily ensue, a post-mortem examination had been arranged, and Dr. Foucart caused much merriment by describing the surprise when the gentlemen (who had not been advised of the success of the operation) came to lay out the body, to find that it was not only alive, but in a fair way towards kicking and screaming. The result, however, shows that 'whilst there is life there is hope' and is a most important fact for the annals of surgical science."

This obviously demanded some action and the secretary was requested to communicate officially with Dr. Foucart and ask him if he were the author of the paragraph in question. He replied regretting his inability to be present at the association's meeting to give the "cartel" to his jealous detractors and expressing his willingness to meet any one of them at his house the following morning. He stated emphatically that he neither published nor, had he known, would have permitted to be published, any such remarks as had appeared in the Press. Rather surprisingly they were appeased by his note and he was informed in a "complimentary" letter that his explanations were deemed satisfactory.

The association took a large share in the drafting of a Medical Legislation Bill which was introduced by the vice-president in 1861. It was subsequently withdrawn, but it formed the basis of similar Bills which were introduced in 1869 and 1875. There is in the annual report for 1861 very little to suggest any marked deterioration in the personnel or the activities of the association, such as had actually occurred. There were only twelve members present at this annual meeting, which, owing to some temporary difficulty about accommodation, was held in the board room of the Sydney Infirmary. The report summed up the association's activities thus:

> The Council offers their congratulations that the Association continues to benefit the interests of the profession. They are unanimous in stating that a marked interest has been manifested in the debates and great sympathy has been expressed by Fellows for the cause of nosological enquiry. It must be remembered that we are united for the purpose of ascertaining scientific truths more immediately affecting the health and diseases of this mighty continent and of diffusing that knowledge amongst the ranks of our professional brethren. Far distant then be the day when anyone shall declare the Australian Medical Association to have been a useless institution. In this Society all are equal and the junior disciple of the healing art fresh from his studies, *"Ingenui vultus puer ingenuique pudoris"* is as welcome in our conclave as a practitioner of timebought experience. Each may assist in the great and sublime researches which tend to increase our knowledge of the physical and mental condition of man's greatest study—himself. In ancient days music, poetry and physic were the attributes of an Apollo. The halo which surrounded a god might lend lustre to a mortal of lower birth; and surely a wide field is open to him who in this new country, exercising the talents, moral and educational, committed by providence to his care, endeavours to solve and elucidate the more than Eleusinian mysteries of science compassed in the wonderful problems of life and death.

Small attendances at meetings continued to be the rule and the number of papers contributed was halved, but the few who did attend were still quite enthusiastic. In November, 1863, James Robertson, the founder of the association, died. He had been unable to attend its meetings for many months just when his influence in preventing its decline would have been invaluable. Little business was transacted at meetings other than discussion of papers. The membership of the association was now so low that it no longer had the authority or prestige to adjudicate in ethical matters and none were referred to it. Several meetings lapsed for want of a quorum, which was reduced from seven to five. The council in its annual report offered the association congratulations on its peaceful progress,

> which like a country successfully governed presents no stirring events, but pursues its onward path without the pomp and circumstance of war, so conferring the greatest happiness on the greatest numbers.
>
> The Council desires to state that the important function of your Association is quietly telling. The great questions of public health such as ventilation, sewerage and concomitant subjects of vast importance in all countries and so comparatively easily practicable in this, must not be lost sight of and although now and then obstructions occur, your Society will persevere in its proper office of pointing out with skill and efficiency what is necessary for the public health.

Yet still the trend was down hill all the way.

W. J. Williams, the new president (1863), in his presidential address discussed a case of poisoning by stramonium which he had treated with injections of turpentine. The patient recovered.

Appeals were addressed to Fellows to attend regularly and punctually or, if too far away, to contribute papers for discussion. Bland, who was aging (he was seventy-four) ceased to attend; MacFarlane resigned. The quorum for general meetings was further reduced to three.

The situation was becoming desperate and various expedients were devised to stimulate interest. In view of the necessity to secure some protection for both the profession and the general public against the unqualified practitioner, it was decided to call a general meeting of the profession in Sydney, at which a subcommittee consisting of Nathan, Williams and Aaron was appointed to wait on the Colonial Secretary and to urge on him the necessity for introducing a Bill, which they had drafted, as a Government measure. They were promised favourable consideration, but the defeat of the Government brought their efforts to nought. If we remember Isaac Aaron's attitude to ether anæsthesia in 1846, it is interesting to find that in 1864 he was just as vigorously hostile to the use of chloroform in obstetrics, which he condemned as being altogether too dangerous.

From 1865 onwards the attendance rarely numbered more than three or four, an increasing number of meetings lapsed, still fewer papers were presented.

The annual report for 1866 was circulated to all present and past Fellows, and a paper by W. J. Williams on the treatment of acute pneumonia, which was considered to be of special value and interest, was widely circulated with a request that any members unable to attend should forward their comments thereon to the secretary. The response was minimal. In 1868 Frederick Milford was president; he went overseas for the year. Only six members paid their subscriptions. Five meetings lapsed; only three papers were read: (*a*) "Hæmorrhoids", (*b*) "The Use and Application of Sulphurous Acid", (*c*) "Medical Statistics of Darlinghurst Gaol for the Year 1867". (The secretary, Isaac Aaron, was responsible for medical treatment of prisoners in the gaol.) When Milford returned he found that preliminary steps had been taken to disband the association. He presided at a meeting on March 15, 1869, at which it was decided that the constitution of the association should be changed. The following resolutions were adopted.

> 1. That the monthly meetings of this Society should be discontinued on account of the apathy displayed by the profession generally and no further subscriptions be taken from the Fellows.
>
> 2. That the existing Laws of the Association be repealed.
>
> 3. That the Benevolent objects of the Association be carried out by three Trustees in whom all the property of the Society shall be vested.
>
> 4. That the balance of the General Fund now in hand shall be amalgamated with the Benevolent Fund.
>
> 5. That Drs. Williams, Milford and Aaron be the Trustees for the future administration of the Benevolent Fund. That all cheques on account thereof shall be signed by the three Trustees. That in the case of the death or resignation of any of them the survivor or survivors shall immediately proceed to fill up the vacancy or vacancies from the body of the Medical Profession, preference being given to former members of the Association: provided also that any Trustee being absent from the Colony or being incapacitated for the period of six months shall be deemed thereby to have vacated his Trusteeship. That the Trustees shall meet for the examination of accounts at least once a year and at such other times as may be advisable to them—they having the power to fix the time and place of such meetings.
>
> 6. That the Trustees be restricted from using more than the annual interest of the Fund from time to time as may be required and that they be empowered to reinvest any securities, which may fall in and any interest remaining in hand.

This action terminated the existence of the association as a medical, scientific and medico-political body.

The association had started under good auspices, its council consisted of the leaders of the profession, men, all of them, accustomed to make a success of everything that they undertook, yet after two or three successful years it deteriorated rapidly. Bland certainly was in his seventieth year, but he was still vigorous; he occupied the presidential chair for two years and attended regularly for several years, participating actively in discussions. It was unfortunate that Robertson's health prevented him after the first two years from taking a more active share in the administration of the association, because, apart from his ability, there were about him a spirit of reasonableness and a capacity for smoothing over difficulties which would in the circumstances have been invaluable. But these two men apart, there were in the association so many other outstanding men of proved capacity who were fully seized of the importance of a medical scientific society that its failure to survive, at least for a longer period, is difficult to understand. The disintegration of the association started in 1861, when so many prominent Fellows who had hitherto been strong in its support suddenly resigned for some reason or reasons which I have been unable to discover. Milford[6][7] was in no doubt as to the cause of its failure.

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> During the 10 years of its active existence the Australian Medical Association did fairly good work, its Fellows having met more than 100 times when many papers of excellence were read and matters of professional interest discussed. The principal reason why the Association failed was that no Medical Journal existed in Sydney to publish the papers read at the meetings and the subsequent discussions which resulted; in this way many valuable theses which probably had cost the authors much expenditure of midnight oil, deep thought and reference to works in many languages, after having been read once were consigned to the waste-paper basket as valueless.
>
> We have hinted before and now we say quite openly that the absence of a medical scientific society in the metropolis of N.S.W. is a disgrace to the profession, and we trust before long that our deceased Society will rise like Phœnix from its ashes to emulate that fabled bird in longevity, and benefit not only the Fellows that would belong to it, but also the whole community.

In support of his argument he instanced the formation of the Medical Society of Victoria in 1852, closely followed by publication of the *Australian Medical Journal* in 1856, both of which, by virtue of their mutual support and cooperation, had been very successful.

The only medical society in New South Wales after the disbandment of the Australian Medical Association was the Association of Medical Officers of the Defence Force, which met quarterly, but whose activities were mainly of a social nature. Firm in his belief that the coexistence of a medical society and a journal was essential for the survival of either, Milford in 1870 set about establishing a journal. With the assistance of two other members, Aaron and Ward, as editors, he persuaded the medical officers of the Defence Force to start a journal, *The New South Wales Medical Gazette*.

They circularized all hospitals and benevolent asylums in the colony, asking for reports of interesting cases or of operations, and appealed to the profession at large to send similar contributions, not only for their mutual advantage, but also to assist in fixing more definitely the characteristics of the diseases of New South Wales and their treatment. After the first year, as they had lost money, the association decided to give up the gazette and Milford took it over both as proprietor and sole editor. It was only his strong sense of duty and his belief in the importance of the journal to the medical community that impelled him to carry on. He repeatedly indicated that he would hand over his task to any medical man who would guarantee its continued publication for twelve months. Finally, in April, 1875, he found he could no longer continue; he was receiving less and less support; a recent issue had lapsed because during an epidemic he had no time to spare for it, and in the latest issue he had himself written 20 of its 32 pages. Accordingly he resigned and six months later the gazette ceased publication (November, 1875). He must have been very disappointed, but there is little hint of any bitterness in his attitude to those whose support he might have anticipated. Only in discussing the proposal to establish a medical club in Sydney, which he regarded as premature, he writes:[8]

> The management and a great part of the expenses, however, would most probably devolve on a few individuals, who after considerable trouble and expense would in all probability not even get the thanks of their professional brethren for all the pains they had taken in bringing the scheme into working order.

Milford did occasionally receive support of the kind he desired—case reports and details of operations. George Hogarth Pringle, of Parramatta, a contemporary of Lister at the Edinburgh Royal Infirmary in 1854, and one of his most ardent disciples, reported as early as 1867 in *The Lancet* his results from "Carbolic Acid as a Surgical Appliance". He described his technique also in articles written for the *Australian Medical Journal* in 1868-1869, but as there was no other opportunity in New South Wales he used the daily Press and incurred thereby the censure of some of his colleagues. However, he felt he was quite justified and defended himself staunchly in the correspondence column of the Press.

> No one is a greater stickler for medical etiquette than I, but I think that like many other good things that can be stretched too far, and that a moral code applicable in England with her local medical societies and journals, is hardly suitable and is in fact much too stringent for the circumstances of a colony like this scattered over 90,000 square miles, in the whole of which not a single medical journal or debating society exists.

In its early years he was a frequent contributor to the gazette, but he died in 1872. Samuel T. Knaggs, a busy practitioner in Newcastle, gave Milford very enthusiastic support, particularly in 1875. Quite often, however, Milford had to rely on other friends like Francis Campbell, the erudite superintendent of the Mental Hospital at Tarban Creek (Gladesville), who could supply at short notice translations from the Greek of Aretaios of Cappadocia ("The Causes and Symptoms of Chronic Diseases") or notes on "Curiosities of Numbers" or on "Human Biology" in a style both lucid and elegant. His botanist friend T. W. Shepherd wrote numerous articles on indigenous and acclimatized medicinal plants in New South Wales, and George Bennett, M.D., F.L.S., to whom the Royal College of Surgeons of England awarded their gold medal because of his important contributions of specimens of comparative anatomy and natural history to their museum, wrote on the therapeutic uses of resins and oils locally produced. The failure of *The New South Wales Medical Gazette* did not pass unnoticed. The editor of the *Australian Medical Journal* wrote (October, 1876):

> Victoria appears to be the only member of the Australasian group where a medical society or a medical journal can continuously exist. In the older colony of N.S.W. attempts have, we believe, been made, from time to time, to establish a Society, and it is only recently that the Medical Gazette which had struggled with difficulties for four or five years finally yielded to what seemed to be its fate.

Once the gazette was, as it seemed, safely launched, Milford renewed his attempts to establish a scientific medical society. In this he was strongly supported by Charles Nathan, a man of great personal charm and culture, consulting surgeon to the Sydney Infirmary, member of the University Senate, active in many aspects of public life. He had great influence with the profession and intended to call them together to discuss the project when unfortunately he infected his finger during an operation and died shortly after of septicæmia.[1] After Nathan's death there was less activity regarding the formation of a medical society. Milford found that his growing practice and his editing and managing of the gazette gave him little leisure. He did, however, regularly remind his readers that the idea must be revived at the earliest moment. A Medical Practitioners' Association was in fact formed in 1872, but its interest centred in improving conditions of friendly society practice. The later issues of the gazette are largely concerned with a proposed medical Bill which was regarded as a matter of both prime importance and urgent necessity. The British Parliament passed a *Medical Act* in 1858, which to some extent formed the basis of Acts passed shortly thereafter in both the newly separated colonies of Queensland and Victoria. These provided at least some measure of control of the unqualified practitioner. In New South Wales, however, where the quack and the charlatan flourished in increasing numbers, every attempt to limit or control their activities in any way had been unavailing. Numerous medical Acts had been passed since 1838, but the main purpose of these was to provide for payment of medical witnesses, who must be legally qualified medical practitioners in actual practice, at coroners' inquests and inquiries before justices of the peace (there has apparently been no increase in these fees since 1838) and to compel the doctors' attendance when requested. There was also authority for the setting up of a medical board and for the maintenance of a register of legally qualified medical practitioners, but there was little advantage in being

[1] Nathan was succeeded in his practice by his son-in-law, an ex-naval surgeon who had recently established himself in Parramatta and who later achieved a knighthood and the chancellorship of the University of Sydney—Henry Normand Maclaurin.

registered. H. G. Douglass in 1860 and James MacFarlane repeatedly thereafter had endeavoured to correct this anomaly, but always without any success—the Bill submitted to the Legislative Council was invariably so amended that it became unacceptable. On various occasions the Premier of the day had promised that a medical Bill would be introduced, but no action at that level was ever undertaken. In 1874 such a promise was given, but as there seemed no prospect of its fulfilment, meetings of medical practitioners were held in Sydney, MacFarlane's Bill was reconsidered and suitably amended, and Sir Alfred Stephen, the ex-Chief Justice, undertook to introduce it into the Legislative Council, which he did in an able speech. The Opposition, however, was well organized, the irregular practitioners were numerous and prosperous, they had established a real vested interest, the most important journals were on their side, and they had support in most unexpected quarters. Professor John Smith, M.D., occupied the chair of physics at the University of Sydney. He had been associated with the university since its origin and had originally controlled the teaching of chemistry also until relieved by Archibald Liversidge. Although the committee appointed to report on the foundation of a university in Sydney had recommended the establishment of five chairs, one being a chair of anatomy, physiology and medicine, there was determined opposition to the establishment of a medical school (in the earliest years at least) by the professors already appointed, headed by Professor Smith. The Act of Incorporation and Charter of the University had empowered it to grant medical degrees on the report of eight examiners, so that it had been necessary to set up a Faculty of Medicine, of which Smith was the unwilling dean. The object of the Bill of 1875 was set out thus:

> that protection should as far as possible be afforded to persons suffering under disease or other bodily ailments, against medical and surgical treatment by unskilled or ignorant individuals and therefore that persons requiring medical or surgical aid should be enabled to distinguish qualified from unqualified practitioners.

Smith constituted himself the spearhead of the attack on the Bill and delivered a very bitter speech, which so impressed his friends that they persuaded him to print it in pamphlet form. He pointed out that although qualified he had never bothered to obtain registration. The Bill could not achieve its object of enabling patients to distinguish qualified from unqualified practitioners.

> There is ignorance and unskilfulness in the profession as well as out of it. There are unqualified practitioners as well as qualified amongst those legally recognized. As regards ignorance within the profession I have had opportunity as one of the medical examiners of the University of Sydney to come across some of it—some candidates legally qualified could not pass an examination, by no means difficult to a person of average ability and experience. This is not to be wondered at. The term "healing art" is more correct than many imagine. Treatment of disease is more an art than a science; no art can be taught by books and lectures only, but must be acquired by practice. A practitioner becomes skilful not by lectures and examinations, but mainly by cultivating his powers of observation. To this end the senses must be cultivated, but over and above that there is a natural power of insight, a kind of divine gift which some men possess and others never attain. We all know that among doctors there is a great difference in the faculty of detecting disease, a faculty not to be acquired by mere book study and sometimes possessed by men who have not gone through a regular course of training. Thus we have unqualified persons in the medical profession—it is to be hoped not many—persons who have mistaken their vocation—but while the fact remains it is impossible to make the public discriminate between the qualified and unqualified by means of legislative enactments. They must learn to discriminate by their own common sense and observation.

The reaction of the profession was immediate and furious. They held indignation meetings, vented their wrath in numerous resolutions, and demanded that Professor Smith no longer continue in office as the dean of the Faculty. Milford[9] for once allowed himself to be rude.

> Professor Smith has overshot his mark. Intending to please a certain section, some of whom are associated with himself in the commercial world and others of more æthereal mind, who are fellow wanderers in the realms of Spiritualistic speculation, he has forgotten himself and the position he holds.

The Bill passed its second reading in the Legislative Council by three votes. It was decided not to press it in the meantime, but to reintroduce it in an amended form next session. It did not become law. In fact there was no control of unqualified practitioners in New South Wales prior to the enactment of the *Medical Practitioners Act* of 1898 and an amending Act of 1900.

In 1876 the Royal Society of New South Wales established a medical section. Its objects are described as follows:

> The meetings of the section shall be devoted to the reading of papers, letters and reports in medicine and surgery or any of the branches of science connected therewith and the discussion thereof.

Pathological specimens were shown and cases discussed, but in later years the subjects considered were mainly those relating to preventive medicine. Meetings of the section continued even after the establishment of the New South Wales Branch of the British Medical Association and its activities continued until 1899. Its early meetings were fully reported in 1877-1878 in the pages of the *Australian Practitioner*, a quarterly journal of which the proprietor and editor was Samuel Knaggs, who was still engaged in general practice in Newcastle. He had been a close associate of Milford in the later days of the gazette, and was fully aware of all his difficulties, but apparently considered that a quarterly journal might succeed where others had failed. He was particularly impressed by the general ignorance of sanitation, and the articles in the *Australian Practitioner*, most of which are from his own pen, deal largely with problems of public health, although a number of good clinical reports are also included.[10]

> Many diseases familiar to observers in the old country reappear here in an altered form and under a variety of guises, often requiring treatment to be modified to suit climatic influence, diverse mode of life or variation of social position.

He sent a copy of the first issue to every practitioner in the Australian Colonies and invited their support, financial or otherwise. The required support was not forthcoming and, like Milford, Knaggs found that a busy practice did not allow much leisure for managing and editing a medical journal. At the end of the first year publication ceased. Cost of production was £122. He had enrolled 67 subscribers, of whom 27 paid up £13 10s., and the income from advertisements was £7 10s. So that the net return from one year's work was a loss of £100.

The British Medical Association had been established in England in 1832, but it was not until 1879 that any steps were taken to form Branches in Australia. The first meetings were held in Adelaide; similar action was taken soon after in Melbourne and Sydney. It was Frederick Milford who initiated the movement in Sydney by calling a preliminary meeting of interested doctors at his home on February 9, 1880, following informal discussions during the preceding months. It was decided that it was desirable to form a Branch of the British Medical Association in New South Wales and the meeting pledged itself to assist in forming the Branch and in advancing its interests. A meeting a week later was attended by 60 members, when suggested by-laws were considered, amended and finally adopted. On March 1, 1880, the first formal meeting of the New South Wales Branch of the British Medical Association was held and the following executive officers were elected: A. Renwick, president; A. Moffitt, vice-president; H. G. A. Wright, treasurer; F. Milford, secretary. Milford informed the Parent Body of the action taken, and at a meeting of the Committee in Council of the British Medical Association held in London on July 7, 1880, the Adelaide and South Australian Branch and the Sydney and New South Wales Branch were granted formal recognition.

In 1881 *The Australasian Medical Gazette* was started in Sydney as a commercial venture. For the first year Milford acted as editor without remuneration. Thus for the first time in New South Wales there coexisted a medical scien-

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tific society and a medical journal, a condition which Milford regarded as essential for the successful continuance of either. It was quite an opportune time for this to happen, since in 1882 Prince Alfred Hospital opened its wards to patients and in the succeeding year Thomas Peter Anderson Stuart arrived in Sydney to establish the Medical School—two factors of profound importance in the advancement of medical science in New South Wales. In this event at least Milford's theory was proven. The New South Wales Branch of the British Medical Association has gone from strength to strength, and *The Australasian Medical Gazette*, which was taken over by the New South Wales Branch in 1895, ended its successful career only when both it and the Victorian *Australian Medical Journal* ceased publication in 1914, to be replaced by The Medical Journal of Australia.

When the Australian Medical Association ceased to function actively as a scientific society provision was made for the continuance of its benevolent fund activities. The general fund of the association was in credit £12 17s. 4d. when it was transferred to the benevolent fund, which then possessed debentures and other assets to the value of slightly over £400, with an annual income of £22. Requests for assistance became increasingly fewer. In 1888 Milford was able to report that only one grant (in 1882) had been made from the fund since 1877. In fact, as at 1901 the total amount paid out since 1868 was less than £200. Of the original trustees, Williams died in 1873, Aaron in 1876. Milford, who lived until 1902, coopted additional trustees as required. Records of the activities and meetings of trustees during this period are scanty, but in 1901 Milford, finding himself once more the sole surviving trustee, invited Dr. Philip Sydney Jones (subsequently knighted) and Sir Arthur Renwick to act with him, and records of all subsequent meetings of the trustees have been preserved. Even in this early period there had been a half-hearted attempt to divert some of the assets of the fund to another purpose. In the late 1870's, when negotiations for the formation of a new society were initiated, there was some inquiry whether the former association's funds could be utilized by a new organization. The matter was even referred for opinion of counsel, who gave an emphatic negative. The trustees' annual meetings were usually short and formal—a report as to claims made and moneys invested since the preceding meeting, a balance sheet, verification of assets, and decision as to investment of moneys available. In 1917 the trusteeship was transferred to the Council of the New South Wales Branch of the British Medical Association, and thereafter three of its nominees filled these positions.

In 1901 there were only twelve Fellows still surviving, nine of whom were still living in the Colony. Advertisements had been inserted for three or four months, drawing attention to the fund, but no claims had been received. It seemed that the fund might be wound up, but if so how were the assets to be disposed? Again legal advice was sought and the advising set out:

(*a*) The Australian Medical Association was already dissolved.

(*b*) That no provision had been made for the disposal of funds remaining after the last surviving member widow or orphan.

(*c*) That as there were still not only Fellows, but widows and orphans still surviving, these latter could, even after the death of the last surviving Fellow, insist on the Trust Fund being kept intact in case he or she might be in need of assistance.

So the administration of the fund continued with only a very occasional grant made until 1934. At this date all the Fellows were dead and so also were their wives. Six of their children were still alive. The £400 in the benevolent fund in 1868 had by the careful administration of the trustees become £2784. It was decided to take steps to terminate the fund, and the matter was argued in the Equity Court in August, 1934. There were two matters for decision:

(*a*) Was further application of the Fund still practical, for the purpose set out in the relevant Law of the Association.

(*b*) If not, how were the assets of the Association to be disposed.

The first question was answered in the negative. There was some argument as to the definition of an "orphan". Could an adult be an "orphan"? The learned judge, without committing himself on this point, ruled that "orphan" in this instance meant an individual who was in need of assistance or had become distressed by reason of the death of his or her male parent, and that it was therefore impracticable to apply the fund for the purpose intended. On the second point he ruled that the assets of the fund should be transferred to the Medical Benevolent Association of New South Wales, which had been established in 1897 to provide necessary aid to distressed members of the medical profession in New South Wales and their relatives.

Thus, sixty-five years after its activities ceased, came the greatest justification for the words of James MacFarlane: "Far distant be the day when anyone shall declare the Australian Medical Association to have been a useless institution."

Acknowledgement.

I am indebted to Dr. J. G. Hunter, Medical Secretary of the New South Wales Branch of the British Medical Association, for making available to me the minute book and other records of the Australian Medical Association, and to Miss M. Rolleston, Branch librarian, for much valued assistance. The published researches of the late Dr. N. J. Dunlop have been most helpful. I have made free use of the valuable records of the Mitchell Library and am very appreciative of the assistance afforded to me by the library staff.

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THE MANAGEMENT OF THE FLAIL LOWER LIMB FOLLOWING POLIOMYELITIS.[1]

By Eric Price,
Melbourne.

The problems in management of the flail lower limb in poliomyelitis are many and varied, and in this discussion it will be necessary to set limits to the subject. It is proposed, therefore, to confine attention to the third, or chronic, stage of permanent residual paralysis, to the exclusion of the acute and convalescent stages, important though these may be. Further, the term "flail limb" will be used to designate those cases in which there is no useful function in the three main portions of the lower extremity, though there may be sufficient residual power in a few muscle groups to induce deformity. Even so, the subject can be covered only very incompletely.

The general aim in management of the flail limb is to provide the patient with a stable, painless limb, retaining maximum mobility and without inconvenient deformity. The primary requirement is the stabilization of the joints affected by the paralysis, by surgery, by splints or by trick movements. Sometimes the surgical treatment can be undertaken at once, but more usually it must be postponed to some elective age because of the influence of

[1] Read at a meeting of the Australian Orthopædic Association, Adelaide, May, 1950.

growth. This entails a period of temporary stabilization by splints, during which time deformity, including shortening, must be avoided. In the final planning of operative stabilization certain principles must be observed. Thus it is of great importance to obtain maximum correction of deformity before stabilizing a joint and to perform soft-tissue operations before arthrodesis. Generally, minor operations should precede major procedures, and the distal limb be dealt with before the proximal. We must also take into consideration the extent and severity of paralysis elsewhere in the body.

In this way what might be called an orthopædic programme should be worked out for each case, and this orthopædic programme must now be briefly considered. The discussion falls naturally under five heads: (i) recognition of the chronic stage, (ii) prevention of deformity during observation, (iii) correction of fixed deformity, (iv) leg equalization, (v) joint stabilization.

Recognition of the Chronic Stage.

Perhaps the first problem is to recognize the flail limb at the earliest moment and so avoid unnecessary prolongation of the convalescent stage.

The convalescent stage is commonly considered in this country to extend over two years, more or less, depending on such factors as age, efficiency of treatment and continued response. In the general case, with mixed paralysis, worth-while recovery may continue as long as this, but with pronounced deceleration after the first six months. In such cases the long period of treatment may be justified, though the present tendency is to reduce it. However, in the special case of the flail limb it is possible to get a very adequate idea of the prognosis early in the disease. Thus Harry (1938) has shown that at six months from the onset few muscles unable to move their joint against gravity will ultimately become useful in the weight-bearing lower limb. Johnson (1945) goes further and considers that an accurate prognosis is possible at three months and that muscles which have not then recovered to 30% of their normal strength will never be useful. Green (1949), in considering the state of the muscles at their first examination after paralysis, found that in eighteen months of "zero" muscles only 0·7% were good and none normal, while of "trace" muscles 12·5% were good and 1·9% were normal.

These statements can be readily corroborated from our own experience, and it is, moreover, common knowledge that the prognosis is bad when paralysis is concentrated in one region.

It follows, then, that for a limb which is flail the prognosis is poor from the start, and by six months at the latest it can be established that no useful function will return. Unless there is some modifying factor, such as the existence of less severe paralysis elsewhere or a lack of adequate previous treatment, it is better for the patient to begin his "orthopædic programme" rather than persist with physiotherapy in a false expectation of useful recovery.

Prevention of Deformity during Observation.

If the patient is too young for final stabilization, the development of deformity during the growth period must be steadily resisted. Absolute success in this effort is probably impossible. Normal adult posture depends, among other things, on growth under normal muscular stresses, and this is clearly not obtainable in a flail limb. Nevertheless it should be possible to prevent major deformity, and this is of considerable advantage when the final stabilization is undertaken.

When the fact of a flail limb is accepted in the young child he should be allowed up and about, if this is not otherwise contraindicated. At the same time deformity is prevented by (i) the provision of an adequate splint and (ii) the maintenance of a full range of movement.

The importance of maintenance of full joint movement needs to be emphasized because it is frequently forgotten. Not all deformity is due to muscle imbalance or to the effects of uncontrolled weight-bearing. Contracture of soft parts is a frequent cause, whose seed is sown in the very earliest stages of the disease in that painful, tender, hyperirritable condition of the muscles known as "muscle spasm". If this condition is treated by immobilization, painful contracture is certain and will not be completely overcome at a later stage. Heat, with active or passive movement to the limit of tolerance, must be applied. Again, contractures are sometimes unwittingly introduced by the practice of splinting a limb so as to favour a particular group. This is especially the case with the calf, in which the contracture is sometimes mistaken for a return of function. However, this practice is more likely to result in a secondary plano-valgus foot which is difficult to manage. Another source of trouble is the doctrine that it is harmful to stretch a paralysed muscle, however briefly. This is deeply ingrained, but it is quite wrong. It is certainly true that prolonged stretching will induce prolonged paresis, but stretching maintained for several seconds has no demonstrable effect on muscle power. This doctrine, however, has resulted in the careful avoidance of taking passive movement through the full range, and, since passive movement alone is possible in the flail region, this full range is gradually lost.

Correction of Deformity.

Despite all care, deformity may arise and will need consideration in conjunction with the final stabilization. From this point of view we can recognize two types of deformity, flail deformity and fixed deformity.

Flail Deformity.

Flail deformity is the result of elongation of ligaments and is assumed only on weight-bearing. Since it is readily corrigible, it adds no difficulty to the performance of the stabilizing operation itself. However, the existence of any serious degree of ligamentous laxity in the hip, knee or ankle will materially detract from the effectiveness of such an operation.

Fixed Deformity.

Fixed deformity results from the contracture of soft parts or the distortion of bones, and is quite another matter, since it must be corrected.

It should be a cardinal rule to correct fully all soft-tissue deformity before the final bone operation is carried out. Such deformity is often a nuisance at operation and may necessitate the sacrifice of bone for its correction at this stage. There is also the danger that sudden reduction of severe deformity at the knee or foot may imperil the distal blood supply.

The use of continuous traction and soft-tissue operations in this connexion is well established and will not be enlarged upon here. It is desired, however, to emphasize the value of repeated manipulation, especially in the treatment of the foot. Under general anæsthesia maximum correction is obtained by manual manipulation and a plaster cast is applied, usually over a flannel bandage, the limb being in submaximal correction. This procedure is repeated at intervals of one month for three or four occasions. The essential features are the repetition and the continuous immobilization, which results in the softening of the contracted structures. In this way even severe deformities will yield. The procedure can, of course, be combined with soft-tissue operations, which are then usually performed as a first stage in the series.

Fixed deformity may also be due to the distortion of bones. Shortening may be regarded as in this category, but will be dealt with separately. Generally these bony defects do not require special management, since they are dealt with at the time of stabilization. Around the knee, however, osteotomy may be required.

Leg Equalization.

Retardation of growth of the affected limb, with consequent shortening, often of severe degree, is one of the aspects of poliomyelitis most distressing to the adolescent, since it may necessitate a tall boot. Any means of controlling or correcting this retardation should therefore be carefully examined, and there has recently been a lot of interest in this subject.

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The cause of the retardation is not definitely known, but it is probable that disuse and poor blood supply are two major factors. Stinchfield, Reidy and Barr (1949) have recently brought forward evidence that it is related to the degree of muscular paralysis present and can be predicted from an estimation of the muscle power present at the end of two years. However, this matter cannot yet be considered fully proven.

Discrepancies of up to one inch perhaps require no special notice. They can be accommodated by the patient's tilting his pelvis or wearing an inconspicuously raised heel. For greater shortening or expected shortening treatment should be considered.

Local stimulation of the metaphysis has been proved ineffective, while irradiation possibly has dangerous effects. There remain four available methods of rectifying the discrepancy.

Lumbar Ganglionectomy.

The use of sympathetic deprivation to stimulate the growth of the paralysed extremity was first suggested by Harris in 1930. Since then, Harris and McDonald (1936), Wilson and Thompson (1939) and Barr (1949) have all confirmed that up to one inch of length can be gained by this means. All emphasize that it must be carried out in early childhood (around six years of age) to be effective, and that the surgical objective is to remove the second and third lumbar ganglia or their equivalent.

In the type of case under consideration, with severe limb paralysis, vascular insufficiency to skin, bone and muscle is practically certain to occur. It has, therefore, been thought reasonable to give these patients whatever benefit might accrue from ganglionectomy as soon as it became clear that a gross degree of muscular paralysis was present throughout the limb. In this way three patients of the 1949 epidemic have been submitted to operation at about eight months from the onset of their illness, and it is intended to continue with these observations.

Epiphyseodesis.

Deliberate operative epiphyseal arrest to secure leg equalization was first carried out by Phemister in 1933. More recently, temporary arrest has been suggested by Haas (1945), using wire, and by Blount and Clarke (1949), using staples.

The operative procedure and after-care are very simple, but the method is approximate only because of the difficulty in estimating the future growth of the patient. It is necessary to know the expected discrepancy, the number of growth years remaining to the patient and the annual rate of growth at the selected epiphyses. From these data the age at which to operate can be calculated. The more accurate, but more complicated, methods of Gill and Abbott (1942) or of Wilson and Thompson (1939) seem to have little practical advantage over rough rules. At the best the correction is approximate and the real advantage is so to reduce the discrepancy that any remainder can be dealt with easily when bone growth is complete. We have used the rule of White and Stubbins (1944) that, regardless of the patient's age and size, arrest of the distal femoral epiphysis retards growth by three-eighths of an inch a year and of the proximal tibial epiphysis by one-quarter of an inch a year. Growth is taken to cease at the age of sixteen years in girls and seventeen years in boys. More recently, Green and Anderson (1947) have advocated a "fixed increment-skeletal age" method. This differs from White's method in that the skeletal age is used instead of the chronological age, and growth is taken to cease earlier—that is, at the "skeletal" age of fourteen years and three months for girls and sixteen years and three months for boys. The yearly increments as found by them are 1·3 centimetres for the lower part of the femur and 0·9 centimetre for the upper part of the tibia, which are naturally a little larger than in White's method based on chronological age.

All authors agree on the necessity for early operation, generally at ten to fourteen years of age. It is best to fuse the lower part of the femur early, according to calculations, thus keeping the upper part of the tibia in reserve. Of course in older patients it may be essential to perform both operations together. Elimination of up to four inches of bone growth can be expected. Deformities due to asymmetrical arrest have been reported, chiefly in the upper part of the tibia, which is technically more difficult to fuse and must be dealt with in combination with the upper part of the fibula.

Bone Lengthening.

Equalization by restoration of length would be ideal, but it is beset with practical difficulties, which are well summarized by Wilson and Thompson (1939); they conclude that the procedure is unsatisfactory in the atrophic bones of these flail limbs.

Leg Shortening.

Shortening of the sound leg must result in a loss of stature and is associated with all the objections of interfering with the patient's good leg. It is otherwise a good method available for the equalization of discrepancies which do not greatly exceed two inches when growth is complete.

The operation is usually performed in the shaft of the femur by some form of oblique osteotomy through the Henry incision to allow either simple overriding or removal of a portion of bone. Internal fixation is necessary. An alternative is the removal of bone from the subtrochanteric region, with fixation by a nail and plate. This puts the scar in skin, bone and muscle in a more desirable position.

Actually bone shortening is not often carried out, and with planned epiphyseodesis during the growing period it should not often be necessary.

Stabilization of the Flail Lower Limb.

When the patient has arrived at the age suitable for bone operations the question of final stabilization has to be considered. The cases will fall into the following main groups, according to the nature of the salient defect.

Flail Limb Compensated for Weight-Bearing.

Flail limb, but compensated for weight-bearing by controlled Trendelenburg gait, slight hyperextension of the knee and a foot which braces passively in a slight equinovalgus position is the reward for good management attended by good fortune, and is the ideal to be aimed at. It is probably unobtainable unless some residual power remains in the hip and calf.

Flail Limb with an Unstable Foot.

Flail limb, as described above, but with an unstable foot, can be readily converted into the first class by stabilization of the foot. Any fixed deformity should be reduced as much as possible before bone operation by soft-tissue operations and manipulation. It then sometimes happens that the foot at the time of arthrodesis is very decalcified and the bone will not cut cleanly with an osteotome. This is not necessarily a disadvantage, however. By simply adjusting technique to the situation it is possible to flake off the cartilage very easily and completely, and the soft, mushy condition of the bones enables them to be easily adjusted by firm manipulation of the foot.

The exact method of dealing with the various joints of the foot will depend upon the details of the deformity.

The Varoid Foot.—Cuneiform resection of the mid-tarsal and subastragaloid joints from the outer side is a standard and satisfactory procedure for the treatment of the varoid foot.

The Valgoid Foot.—In the treatment of the valgoid foot surgical access for wedge resection is a difficulty, and preoperative correction of the deformity to permit plane resection is a great advantage. Another technical variation which may assist is to use the method of inlaid cortical grafts from the tibia, though this gives only a partial arthrodesis and is more suitable for destructive lesions. There is a tendency for the valgoid deformity to persist. This probably arises from more than one cause. There is the technical difficulty referred to above. There is often,

too, a considerable degree of hypermobility of the ankle in these cases, which may not be fully appreciated before operation. Finally, it is the practice of some surgeons to permit weight-bearing in the plaster splint, which seems certain to encourage a recurrence of the deformity.

The Equinus Foot.—A fixed equinus deformity must not be reduced without calculation of how much of this may be essential to the initiation of hyperextension in the knee joint. Various modifications of the "triple arthrodesis" have been devised to control equinus deformity with preservation of ankle movement. The most generally satisfactory is the Lambrinudi type, but if the ankle ligaments are very lax it is impossible to control the foot drop fully by these means. To meet this difficulty Barr (1949) advocates tenodesis of the *peroneus longus* and *tibialis anterior* tendons. Alternatively, the ankle may be included in the fusion, which can be performed conveniently by means of the vertical approach of Campbell along the lateral margin of the *extensor digitorum longus* tendon, extended upwards. Epiphyseal plates must be preserved carefully, and after excision of all articular cartilage the resulting cavity is packed with bone chips from the tibia. The required degree of equinus position is maintained by the insertion of a plate of tibial cortex in the front of the joint.

The Calcaneus Foot.—Flail calcaneus deformity is a considerable inconvenience. It has been met by various devices. A square ferrule is seldom satisfactory except for a very small child, as the forces involved break the boot. For a similar reason, tenodesis of the calf tendon is not permanently satisfactory. The most satisfactory procedure is arthrodesis of the ankle. The operation must usually be performed in two stages, since associated cavus deformity or lateral instability is almost always present. This is corrected at a first operation, the foot being placed in an exaggerated position to flatten the arch.

Flail Limb, but with an Unstable Knee.

The mechanism for standing with a completely paralysed quadriceps is to hyperextend the knee so that the line of action of the body weight lies in front of the axis of rotation of the knee. This involves, first, a certain degree of ligamentous laxity and, secondly, the means of initiating hyperextension by forces outside the knee joint. These outside forces may be provided by the extensors of the hip joint or by the flexors of the ankle. In the flail limb a fixed equinus position is the usual means of initiating this "locking" action.

If the above mechanism fails, stabilization of the knee is usually effected by a lock-knee calliper. This permits the patient to sit or stand without much inconvenience, and any slight instability of the foot can be controlled by a T-strap.

Arthrodesis of the knee may produce an excellent result, but its only real advantage is to eliminate dependence on the calliper. On the other hand, there is a considerable risk of fracture in the lower part of the femur.

Perhaps insufficient attention has been paid to methods of reinforcing the normal mechanism. Many patients, of course, do so with the hand. Sometimes the provision of a high metatarsal bar will assist the patient who is nearly able to hyperextend his knee. This has proved a particularly valuable device in restoring confidence after stabilization of the foot. However, it would seem that there is every theoretical reason for performing a controlled supracondylar osteotomy to enable the line of gravity to fall in front of the axis of the joint.

Flail Limb, but with Generally Unstable Hip.

Lateral instability of the hip is normally overcome by the Trendelenburg gait. Attempts to improve this by a weight-bearing calliper or the Schantz type of osteotomy are not usually satisfactory.

Rotational instability is sometimes a nuisance, but can be reduced by a pelvic band and hinged hip joint to the calliper.

Antero-posterior instability produces an ugly forward lurch of the pelvis and is not amenable to treatment.

It is thus apparent that stabilization of the hip by conservative means is a rather unsatisfactory procedure, and still more so if a paralytic dislocation is present. Patients in this class are likely to require a stick to control the gait. In view of the excellent results of arthrodesis in pathological dislocation, it would appear that this might be useful in carefully selected cases of the flail limb. One such case can be reported here, in which the result is satisfactory, and without loss of the ability to control the knee.

Flail Limb, with Instability in the Other Hip.

If both hips are unstable the patient will have difficulty in retaining his balance, even on two legs. Except in a few cases of unusual skill these patients require two crutches or strong sticks. Drastic surgical intervention is therefore not generally indicated. It must always be remembered that these people sit much and walk little, and tend to walk less as they grow older and heavier.

Flail Limb, too Short to be Used.

Useless legs, known sometimes as "swingers", are uncommon, but difficult to improve. The patient has usually managed to do well enough without this limb, using two crutches. It would seldom seem advisable to shorten the good leg, and the atrophic limb cannot control the splint and tall boot necessary to achieve weight-bearing.

Flail Limb with Serious Weakness Outside the Legs.

Serious weakness in the arms or trunk greatly increases the patient's difficulties and should be carefully considered before an ambitious orthopædic programme is commenced. If the arms are poor, the effective use of a stick or crutches may be impossible. Trunk weakness may be of such degree that a jacket must be worn, which is an obvious inconvenience if a calliper is also needed. It is then helpful to prolong the outer bar of the calliper and to secure it to the jacket through a hip hinge.

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SOME OBSERVATIONS ON 100 CASES OF ANKYLOSING SPONDYLITIS.

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If literature is taken as a criterion, world-wide interest in ankylosing spondylitis has been aroused.

Last year Simpson and Stevenson published an analysis of 200 cases occurring in Great Britain. It was thought that the publication of 100 cases of ankylosing spondylitis, all from the eastern States of Australia, might serve as a geographical contrast. For purposes of comparison results are set down in a somewhat similar form, but it is stressed that many of our cases are early and mild. The data given are from records in both hospital and private practice. When symptoms and history point to the disease we emphasize its initial phase; but radiological evidence is completely lacking both in the spine and in the sacro-iliac joints.

Sex Incidence

In the group of 100 cases instanced, 57 patients were males and 43 females.

In Table I below, statistics from Great Britain and the United States are compared with local figures. A wide disparity in findings, due probably to the stratum of patients seen by each group of workers, undoubtedly exists. Apparently those rheumatologists examining service personnel note a high male preponderance, while in our practice, civilian and public hospital, where 65% of patients are women, the female rate is increased.

Table I.

Authority.	Number of Subjects.	Ratio of Males to Females.	Approximate Ratio.
English workers:			
Scott	555	396 : 159	3 : 1
Fletcher	90	54 : 36	3 : 2
Buckley	150	130 : 20	6½ : 1
American workers:			
Swaim	106		4 : 1
Polley and Slocumb	1035		9 : 1
Hare			10 : 1
Boland	1000 (approximately)		20 : 1
Parr, White and Shipton (present series)	100	57 : 43	5 : 4

Age at Onset.

The average age at onset was twenty-six years, the disease being in the main a disease of early adult life. A period of 5·8 years on the average elapsed between onset of symptoms and the making of a correct diagnosis. This latter fact indicates the present medical unawareness of early symptoms, signs and radiological appearances, and the need for more widespread recognition amongst the medical profession of a pre-radiologically obvious phase, as well as the little recognized lapse of time between onset of symptoms and positive radiographic signs.

A focused view of age incidence as quoted by American and British authorities is given below (Table II) and is compared with the local series, the maximum age of incidence in which was fifty-six years and the lowest thirteen years.

Initial Diagnosis.

Interrogation of the patients revealed that in less than half the recorded cases had a correct diagnosis been made, at any rate as regards nomenclature. However, in several cases a diagnosis of sacro-iliac arthritis had been made, but no therapeutic measures had been taken to meet the situation, and therefore in these cases the medical examiner may have been aware of the nature of the disease but unaware of beneficial remedies.

[1] The biochemical estimations were carried out by J. Fewtrell, B.Sc.

Among the diagnoses made were various gynæcological conditions, anxiety neurosis, depressive psychosis, fibrositis, lumbago, lumbo-sacral strain, "nerves" and tuberculous iliitis. We have seen typical sacro-iliac disease labelled as osteoarthritis, truly a tragic mistake.

It is notable that four women, variously and unsuccessfully treated for lumbar pain of what was considered gynæcological origin, achieved rapid remission under X-ray therapy.

The patient with "depressive psychosis" was given electroplexy, while the unfortunate with "tuberculous iliitis" was placed in a plaster cast, to his permanent incapacity. It is fortunate that confusion between ankylosing spondylitis of the sacro-iliac joints and tuberculous iliitis seems to be much less than a decade ago, especially as their therapies are diametrically opposed.

Table II.

Age Incidence: Approximate Percentages.

Age. (Years.)	Polley and Slocumb. (1034 Cases.)	Fletcher. (90 Cases.)	Buckley. (97 Cases.)	Simpson and Stevenson. (200 Cases.)	Present Series. (100 Cases.)
Under 20	24%	10%	17%	21%	16%
20 to 29	51%	29%	37%	40%	56%
30 to 39	17%	26%	26%	23%	23%
40 or over	8%	32%	19%	16%	5%
Average age incidence	26·7 years	32 years (approximately)	31 years (approximately)	33 years (approximately)	26·4 years

Associated Factors.

Focal sepsis did not obtrude itself as a factor in our series, nor did trauma, although a varied collection of untoward events had occurred in nine cases.

Athletic Build.

Of the patients 12% were of strikingly athletic type, while the large majority were average or above in physique.

Iritis.

Iritis was complained of by four patients, in one of whom, despite treatment, complete blindness occurred in one eye.

Thoracic Involvement.

In 22% of cases thoracic involvement was noted, consisting of reduced chest expansion and complaints of pain on deep breathing, coughing and sneezing, or a restricted feeling as if a tight hand gripped the chest, especially in the morning after rest or after severe exertion. It is remarkable that many patients suffering from this syndrome may have considerable restriction of chest expansion without being conscious of its presence. Unless this is sought for as a routine measure, the minimal character of associated muscular pains abets failure of detection of the disease through negligent or cursory medical examination.

Occurrence in Service Personnel.

In three cases the syndrome began during war service and in five others was aggravated by service. This complaint in one case first occurred at Milne Bay and on a number of occasions was diagnosed as fibrositis. The disease was active, progressed rapidly, presented a typical feature in the spread of the pain from the lumbar part of spine to the back of the knees, fluctuated from side to side, and finally manifested bilateral involvement to give diagnostic certainty.

Climate.

A number of service personnel became affected initially whilst on active service in a tropical climate—namely, New Guinea. The hot, dry interior and the tablelands, generally cold in winter and warm in summer, add their

quota to the incidence of the disease. The well-fed farming and grazing community suffered just as much as that of the city, and the combination of healthy outdoor and fresh country life does not militate against severe and active disease. We have seen a number of patients from the coastal belt of northern New South Wales, where a mild winter is associated with a hot, humid summer. In our opinion climate is not a factor in causation, and has little effect on the course of the malady, and a healthy outdoor life in the sun does not prevent the occurrence of the disease or alter its progress.

Neisserian Infection.

A history of gonorrhœa was given by four patients. We consider that the gonococcus is probably of no ætiological significance, unless it is a provoking factor or a common denominator of many probably associated factors of causation. In some instances this disease has followed gonococcal infection, but the gonococcus has disappeared, and only the secondary invaders, the streptococci and staphylococci, remained in the prostate.

Tuberculosis as a Factor.

Only one case of tuberculosis was noted. This patient, a male, had a typical flat back and reduced chest expansion; but as the disease was in the fibrous stage no X-ray changes were noted in the sacro-iliac joints. The duration of the disease in his case was six years, almost the outside time limit in our experience for definite sacro-iliac radiological evidence.

Childbirth.

Five patients treated in the series either dated their symptoms from childbirth or complained that symptoms had been aggravated thereby. Pelvic infection has never been noted as an initiating factor. Clearing up of such an infection has not been followed by any dramatic response, as seen by us in some cases of rheumatoid arthritis. A number of women dated their symptoms from the middle of pregnancy and stated positively that exaggeration took place during the final months of gestation—a feature entirely different from that of rheumatoid arthritis, the remission of which in the same period is generally spectacular.

Family History.

In 11% of cases there was a family history, the relatives affected being respectively (i) a mother and her two sons, (ii) a brother and sister, (iii) two sisters and (iv) two brothers on two occasions.

In no family group were the cases alike. But inquiries regarding the health of other members of the family in two cases elicited a history of sciatica, and X-ray examination clinched the diagnosis.

Initial Symptoms.

The initial symptoms were noted as in Table III.

The proportion of initial peripheral involvement—namely, 6%—compares favourably with the English figures, but is much less than that of the American Boland.

Pathological Findings.

Erythrocyte Sedimentation Rate.

The erythrocyte sedimentation rate was raised initially in 45% of cases. In evaluating this it should be realized that in many of our cases the lesion was early and mild.

The erythrocyte sedimentation rate is occasionally raised in patients apparently well, and remains so notwithstanding therapy and both subjective and objective improvement. In others, with severe, active and extensive disease, the erythrocyte sedimentation rate is and always has been low since first the patient came under observation. However, an increased erythrocyte sedimentation rate was helpful as a signpost pointing to the syndrome; but the absence of a rise should not be regarded as significant in either the making of a diagnosis or the initiation of treatment.

A secondary anæmia (3,500,000 erythrocytes per cubic millimetre or less) was noted in 17% of cases. A leucocytosis of 10,000 or over per cubic millimetre was found in 8%.

Serum Calcium Content.

The serum calcium content was found to be within normal limits.

Plasma Proteins.

With a view to finding out whether the plasma proteins were greatly disturbed in ankylosing spondylitis, we made a series of plasma protein estimations and record our result in twenty cases (Table V). We also attempted to estimate the daily urinary methionine excretion of some normal Australians (young men and women), and in a number of cases of ankylosing spondylitis and rheumatoid arthritis. These tests were made to find out if this essential amino acid was caught up in the pathology of the disease.

TABLE III.

Anatomical Site.	Percentage of Cases.
"Low back"	44
"Low back" and other sites	12
Hips	12
Sciatic nerve and posterior area of thigh	14
Dorsal and cervical parts of spine	3
Dorsal part of spine	6
Cervical part of spine	1
Periphery (Shoulders 3%, feet and ankles 1%, knees 2%)	6

Discussion of Some of the Above Findings.

In Case 1 there were a low fibrinogen content in the plasma, normal albumin-globulin ratio, low euglobulin content, normal erythrocyte sedimentation rate and low methionine excretion.

In Case 2 there was a high euglobulin content associated with a moderately raised erythrocyte sedimentation rate, whilst it will be noted that the fibrinogen content actually increased as the erythrocyte sedimentation rate fell. Generally these two values rise and fall together, but the fibrinogen content may lag behind the erythrocyte sedimentation rate. The increased fibrinogen content also accompanied the improvement in the albumin and globulin fractions with the betterment of the albumin-globulin ratio. In severe cases of ankylosing spondylitis the ratio may be almost 1:1 and is rarely reversed.

TABLE IV.

Erythrocyte Sedimentation Rate: Millimetres (Westergren Method: Time 60 Minutes).	Percentage.
11 to 20	19
21 to 30	6
31 to 40	8
41 to 50	6
51 to 60	0
61 to 70	3
71 to 80	2
81 to 90	1
Total	45

The figures in Case 5 reveal a high fibrinogen content in extensive and severe disease with a high euglobulin content; but the albumin-globulin ratio was normal and there was little disturbance of plasma albumin and globulin contents, a feature uncommon in active rheumatoid arthritis.

In Case 6 a high fibrinogen and high euglobulin content with a raised erythrocyte sedimentation rate were observed in severe, extensive and active disease. In active progressive disease this combination is common.

In Case 14 the only real abnormality was the fall in the total protein content and the plasma albumin content, which occurred whilst the erythrocyte sedimentation rate

Table V.

Patient's Sex; Case Number.	Age in Years.	Date.	Total Protein.[1]	Fibrinogen.[1]	Albumin.[1]	Globulin.[1]	Euglobulin.[1]	Pseudo-globulin.[1]	Erythrocyte Sedimentation Rate.[2]	Urinary Methionine Excretion.[3]
M (1)	26	11.12.44	6·61	0·46	4·44	1·71	0·30	1·41	—	—
		6. 8.45	5·55	0·28	3·81	1·46	0·47	0·99	6	156
M (2)	23	1. 8.45	7·03	0·60	3·31	3·12	0·71	2·41	56	
		15. 4.46	6·23	0·66	3·85	1·72	0·46	1·26	43	
		18. 6.46	6·65	0·79	4·20	1·66	0·45	1·21	26	
		9.10.46	6·25	0·83	3·70	1·72	0·45	1·27	30	
M (3)	32	16. 8.46	6·37	0·61	3·83	1·93	1·00	0·93	30	
M (4)	38	18. 2.46	5·70	0·32	3·95	1·43	0·39	1·04	—	
		26. 6.46	6·38	0·59	3·78	2·01	0·39	1·62	—	
		11. 6.47	7·11	0·49	4·07	2·55	0·37	2·18	20	
M (5)	26	28. 2.45	6·65	0·84	4·08	1·73	0·91	0·82	—	
M (6)	45	21.11.45	7·41	0·78	3·92	2·71	0·95	1·76	—	
		30. 6.47	6·79	1·11	3·36	2·32	0·70	1·62	65	
		22. 9.47	6·70	0·76	3·50	2·44	0·82	1·62	—	
M (7)	34	18.11.47	5·96	0·73	3·52	1·71	0·30	1·41	30	
F (8)	56	10. 5.46	7·28	1·06	3·26	2·96	1·80	1·16	105	
		25. 6.47	7·59	0·67	3·56	3·36	1·26	2·10		
M (9)	26	21. 3.46	6·06	0·52	4·16	1·38	0·42	0·96	3	
		29. 7.47	5·92	0·40	3·87	1·65	0·32	1·33		
M (10)	28	25.10.46	6·34	0·59	4·24	1·51	0·48	1·03	16	
M (11)	23	13.12.45	6·03	0·67	3·50	1·86	0·70	1·16	30	224
		28.10.46	6·74	0·67	4·14	1·93	0·56	1·37	15	315
		16.11.47	6·12	0·50	3·33	2·29	0·46	1·83	8	
M (12)	26	11. 2.46	6·86	1·10	3·50	2·26	1·13	1·13		
		11. 9.46	7·26	0·89	3·44	2·93	0·79	2·14		
M (13)	24	6.12.44	7·88	0·53	4·86	2·49	0·62	1·87	15	
		12. 4.46	6·64	0·53	4·19	1·92	0·46	1·46		
M (14)	26	16. 7.45	6·31	0·42	4·00	1·89	0·42	1·47	3	114
		10. 4.46	6·30	0·50	3·99	1·81	0·42	1·39		164
		14. 7.47	5·37	0·42	3·21	1·74	0·37	1·37		213
		9. 9.47	5·55	0·36	3·19	2·00	0·41	1·59	4	243
M (15)	40	12.10.44	6·58	0·80	2·76	3·02	1·06	1·96	29	
		2. 3.45	6·65	0·77	3·98	1·90	0·73	1·17	16	
M (16)	36		5·31	0·67	3·39	1·25	0·48	0·77	15	
M (17)	30	15. 5.45	6·62	0·72	4·28	1·62	1·01	0·61	49	
		19.11.45	6·60	0·91	3·48	2·21	0·60	1·61	66	
		6. 2.46	6·43	0·68	3·23	2·52	0·90	1·62		
		28. 3.47	6·30	0·14	4·34	1·82	0·38	1·44	14	
F (18)	27	31. 1.45	6·70	0·50	3·89	2·31	0·54	1·77	13	
		27. 4.45	6·80	0·45	4·60	1·75	0·95	0·80	10	
		29.10.45	6·53	0·42	4·33	1·78	0·41	1·37	10	
M (19)	27	8.11.45	6·63	0·46	4·26	1·91	0·46	1·45	11	
M (20)	42	27.11.44	7·13	0·88	3·54	2·71	0·96	1·75	92	

[1] Grammes per 100 millilitres of plasma.
[2] Millimetres in one hour (Westergren method).
[3] Milligrammes in twenty-four hours.

remained normal. Urinary methionine excretion rose from 114 to 243 milligrammes per day, an improvement coinciding with the clinical improvement.

In Case 15 there was a reversal of the albumin-globulin ratio with a moderately raised erythrocyte sedimentation rate—an uncommon finding.

In Case 17 a typical response to successful therapy is seen in the reduction of fibrinogen content to normal, the reduction of the euglobulin content to normal and a pronounced reduction of the erythrocyte sedimentation rate. In this case the rise in fibrinogen content from 0·72 to 0·91 gramme per 100 millilitres of plasma following reaction to X-ray therapy was accompanied by a decreased plasma albumin content, an increased globulin content and an increased erythrocyte sedimentation rate. However, the reduction of the euglobulin content constituted a favourable sign. X-ray therapy seemed to increase some biochemical abnormalities, but the lowering of the euglobulin fraction of the plasma was an indication of improvement.

As regards Case 18, the rise in euglobulin content followed X-ray therapy, but it is noted that the plasma albumin and globulin contents and the erythrocyte sedimentation rate had all improved.

In Case 19 we observe what has been often found—the more or less normal values for plasma proteins with a normal erythrocyte sedimentation rate even in a mildly active disease as judged by clinical history and interrogation.

Examination of the records of Case 20 reveals a high fibrinogen content, reduced albumin content, increased globulin and euglobulin contents, and a much raised erythrocyte sedimentation rate. This man had active disease of long standing which had apparently followed an early Neisserian infection.

On the whole, the pattern of response of the plasma proteins to the disease is similar to that of rheumatoid arthritis, except that the fibrinogen level tends to be a little higher and often remains raised in the absence of acute and subacute disease or in the presence of a normal erythrocyte sedimentation rate. Our findings agree with those of other investigators; but because the methods are time-consuming and do not give any more idea of the severity of the disease than the erythroctye sedimentation

rate in the majority of cases, we have abandoned these procedures. It has been noted that œdema of the feet is often accompanied by a much reduced plasma albumin content and a reversal or near reversal of the albumin-globulin ratio as observed in Case 8. In general high fibrinogen values are associated with a high erythrocyte sedimentation rate, but the return to normal of the former lags behind that of the latter.

Normal urinary methionine excretion rates are generally 0·25 to 0·50 gramme per day (American); but in young adult Australians we have observed more values in the vicinity of 0·4 or 0·5 gramme than the lower figure of 0·25 gramme. In the above cases and in others the methionine excretion figures were very low, suggesting that this amino acid either is not being absorbed or is being broken down more than normal. However, as the patients' condition improved, the methionine excretion rose to the lower limits of what the American workers have regarded as normal. These low figures suggest that methionine may be of value in ankylosing spondylitis. We have used both methionine and cystine mainly with a view to preventing nausea from X-ray therapy, and they seem to have some clinical value.

One other feature has been often observed, and that is the presence of a much raised erythrocyte sedimentation rate (60 millimetres by the Westergren method, in one case) which has persisted for years with no clinical evidence of activity, the patient leading a normal life within the bounds of limitation imposed by residual deformity. However, we have found that after years of symptomatic quiescence, such patients are liable to sudden acute exacerbations without any ascertainable cause.

To be symptom-free in the presence of a much raised erythrocyte sedimentation rate has been the lot of quite a number of our patients—a paradox which is inexplicable, especially when it has continued for a number of years.

X-Ray Findings in the Sacro-Iliac Joints

The X-ray findings in the sacro-iliac joints may be divided into the following four types:

Type I: bony ankylosis present (20%); Type II: gross changes, no ankylosis (56%); Type III: osteoporosis or other minimal changes (14%); Type IV: no osseous lesion detected at the time of the original examination (10%). Of the cases in the last group, one proved to belong to Type II in three years, three proved to belong to Type II in four years, two proved to belong to Type III in one year, one proved to belong to Type I in four years, and one proved to belong to Type II in eight years. In the remaining two cases the symptoms, signs and erythrocyte sedimentation rate and response to X-ray therapy are such as to make diagnosis reasonably certain.

Diagnosis.

Of the patients in this series, 82% show sufficient improvement to enable them to live as normal economic units of the community. This result stimulates the plea for greater awareness of this unnecessarily crippling disease. The earlier the diagnosis is made, the greater the success in treatment, as was remarked by another rheumatologist; hence the importance of watchfulness for the signpost symptoms, which may be compared in diagnostic importance with pain in the right iliac fossa as in appendicitis. Scott's original aphorism in this matter was as follows:

> An early stage of spondylitis should always suggest itself when a young adult, male or female, complains of recurrent pain in any part except the back. Pathological changes, sacro-iliitis as demonstrated by a radiographic examination, will at once dispel any doubts of the diagnosis.

Scott was laying emphasis on the generalized pains, for which often no cause is revealed on ordinary examination, and which if inexplicable may call for radiological evidence of the condition of the sacro-iliac joints. The common finding of the disease in service personnel, among whom for a number of years many false diagnoses were made, is of importance to the community and may call for a routine radiological examination of the sacro-iliac joints of all army recruits.

The ability of many subjects of ankylosing spondylitis to slip into the armed forces undetected by ordinary examination reveals the minimal nature of both clinical symptoms and signs in many instances. Once there are diminution of back-flexion, a history of recurrent attacks of low-back pain, pain in the buttock going down the back of the thigh to the knee, dorsal kyphosis or thoracic girdle pains, the diagnosis is relatively easy; but it is strange how many cases are still being constantly missed in those early stages, when therapy is so beneficial and deformity or disability minimal. Cervical fibrositis which persists in a young adult should raise questions regarding any antecedent lower-back pains, and even the mildest symptoms lasting a few days and recurring at irregular intervals in the lumbar area or buttocks, if sought for and elicited, may be the clinical mask behind which radiologically obvious sacro-iliac disease may be found. The mild nature of the symptoms and the absence of clinical signs delude the uninitiated and disarm the clinician.

If a knowledge of the symptoms of the disease, especially in the prodromal stage, is acquired and the clinical ear is attuned to a recital of the typical history and its variations, ankylosing spondylitis will be found more often in both male and female, even though it mimics so many other diseases. Because after minimal symptoms in the lumbar region it may concentrate in the cervical part of the spine and the thorax, we have seen in many instances radiological examination of these areas undertaken whilst the sacro-iliac joints are left unexamined and the true nature of the disease is unrecognized.

The diagnosis of fibrositis of the cervical and dorsal parts of the spine, made because of the absence of any radiological evidence of bony or ligamentous abnormality, has been common in our experience, the true nature of the disease being missed for years. It is true that in many cases of ankylosing spondylitis there may be restricted movement of the neck and of the dorsal part of the spine and radiating pains with reduced chest expansion with negative radiological evidence in these areas, and that there may be also associated clinical evidence of this disease in the lumbar and sacro-iliac joints with negative radiographic findings. In these cases in which the history and clinical signs give the diagnostic cue but without radiological confirmation, we think X-ray therapy is justified as a therapeutic tool. The response in these cases is excellent, and as years may elapse before positive radiographic changes permit diagnostic certainty, we think it is unjustifiable to withhold the only proven remedy of value. The milder character of the disease in women as compared with men adds to the difficulty of diagnosis as it concerns the fairer sex; but even in them the disease can be severe, fulminating and rapidly progressive. Although the concentration of the disease in its early stages is generally in the lower part of the back, the involvement of the peripheral joints, especially in the knees and shoulders, but not the smaller joints of the hands and feet, should lead to careful consideration of any spinal symptoms even though evanescent and mild in character.

The morning stiffness which disappears on exercise or as the morning wears on is typical of the rheumatic diseases and of ankylosing spondylitis, and if it is spinal in distribution in a young man or woman it should be viewed with suspicion.

For successful therapeutic results we must not wait until the full tragedy of the disease is visible—the rigid spine, the craned neck, the rigid thoracic cage, the dorsal kyphosis, the flattened back, the flexed hips, the restricted shoulder joints and the centrifugal spread along the limbs; but we must be up and doing before the imprint of the disease upon the physical frame is easily discernible. In some instances the disease will march undeterred by the present therapeutic tools, but in the main early diagnosis and treatment can prevent or hold back its progress. Rarely a patient presents himself or herself for the first examination with a typical poker back, so insidious has been the disease.

Dr. C. B. Heald recently advocated in a report to the New Zealand Director-General of Health that, in view of the diagnostic significance of the X-ray appearances of the sacro-iliac joints, radiological change in these joints could be made a matter of notification. To this we add a plea for early diagnosis and treatment even before typical X-ray changes occur. We consider that a typical history frequently underlined by a raised erythrocyte sedimentation rate should be regarded as an indication for the inception of therapy, and that one should not wait for the satisfaction of positive X-ray findings and have a patient well on the way to crippledom, along the down grade which leads via ankylosis to that pitiful figure, the human question mark. Diagnosis may be helped by a favourable response to X-ray therapy in cases in which radiological evidence is lacking. It is our routine to have the sacro-iliac joints radiologically examined for all patients under the age of twenty-five years complaining of vague rheumatic pains which have persisted for a year or more, either continuous or intermittent. Another point of diagnostic importance is the frequency of ankylosing spondylitis in the thoracic region, which produces the complaint of pain on sneezing or coughing while there is a measureable decrease in chest expansion, often associated with minimal lumbar pains.

Finally, let us state one important fact—that early recognition by the general practitioner is the answer to effective therapy and control of the disease.

Radiological Diagnosis.

The clinician would derive considerable help from a radiographic report with some standard terminology devised to conform with the recognized stages of the disease, as suggested by G. L. Rolleston.

An annotation regarding the stage of the disease, following a routine mention of the condition of the apophyseal joints and the *symphysis pubis*, would often be of assistance in further establishing the diagnosis. A greater frankness in the radiographer's impression in the osteoblastic, osteoclastic phase of sacro-iliitis would be of tremendous value to the clinician in evaluating the earlier phase of the disease.

Discussion.

Observation of this series leads us to believe that the syndrome ankylosing spondylitis is an entity in its own right and not rheumatoid arthritis of the spine.

The proportion of women to men is greater than in any published report available to us. We note that the disease in women generally follows a milder course, but may be just as severe and extensive as in males. There are many mildly afflicted among the community of sufferers, the minimal nature of whose symptoms and signs account for mistaken diagnosis. However, the absence of standard terminology adds to the confusion of the disease, especially as it would seem that the radiologists are at variance regarding interpretation of the significance of changes around the sacro-iliac joints. It is only by watching this disease for many years and taking serial radiographs that one can be certain that definite changes are those of ankylosing spondylitis. The disease is so different from *spondylitis osteoarthritica* that a mistaken diagnosis is hardly conceivable; but this does occur. In the main the disease is not recognized because it is not suspected. To treat a patient as suffering from ankylosing spondylitis owing to a mistaken diagnosis is by no means so detrimental as to fail to diagnose and treat effectively the disease of the afflicted young man and woman, who may thus lose many valuable early years during which the disease is often vulnerable and amenable to therapy. We observe that the recognition of the disease, as distinct from that of tuberculosis of the sacro-iliac joints, has led to the abandonment of plaster immobilization of the spine and hip with its evil consequences. In ankylosing spondylitis immobility is the handmaid of crippledom and activates the disease. Stress is laid on the importance of diagnosis in the prodromal stage, when symptoms and signs of varying degrees, with or without confirmatory laboratory findings, are the only criteria available. In these cases serial X-ray films confirm the diagnosis over a period of up to seven years following the initial symptoms.

Therapy.

In this series of cases our main line of therapy was by means of X rays, although we have mentioned previously that adrenaline may be of value for febrile patients, and that calcium gluconate and sulphadiazine are of some value. The application of plaster cast shells and orthopædic operations for deformity or the aftermath of the disease are not considered. Our aim is to point out that the disease must be diagnosed early, as X-ray therapy is a potent tool which produces a remission or controls the disease in the great majority of cases.

Hernaman Johnson has stated that "the key to early diagnosis lies in the sacro-iliac joints", a fact previously stressed by Gilbert Scott; but as radiological diagnosis may not be established until years after the disease begins, the typical clinical history in the susceptible age groups with or without evidence of rigidity or reduced flexion of the lumbar part of the spine should constitute a valid reason for a trial of X-ray therapy.

The therapy may be valuable at all stages of the disease. We have observed a much reduced back flexion (eighteen inches from the tips of the fingers to the floor) be completely relieved and the patient touch the floor quite easily. However, this degree of recovery is not common except in early cases, in which there are apparently considerable muscle spasm and fibrositis.

Our therapy followed that advocated by Gilbert Scott, the undermentioned factors being employed: A field of 12 inches by 12 inches, 130 to 140 kilovolts peak, five milliamperes, and a filtration of one millimetre of aluminium and a quarter of a millimetre of copper. Dosage is generally 60*r* to 100*r*, but rarely 30*r* may be employed. The treatments are given twice a week on ten occasions. Such a course may be repeated within two to three months according to results.

We have not employed the higher kilovoltage of 200 to 220 and the intensive therapy advocated and practised by many radiotherapists. Our results compare favourably with those of the workers who use the higher peak kilovoltage. For a few years we have employed small fields twelve inches long by six inches wide, and have found a reduction in nausea, but no reduction in efficiency.

Results.—We began using X-ray therapy for the treatment of ankylosing spondylitis in 1938, and we can claim that although there are still a few failures even in the early stages, the results leave no doubt about the efficiency of the method. The results are as follows: greatly improved, 48% of patients; improved, 38%; relieved, 10%; unrelieved, 4%. X-ray therapy has altered our outlook on this disease, and the steroids may further release us from the bonds of helplessness in the treatment of those patients only partially relieved or unrelieved.

Summary.

The incidence of ankylosing spondylitis amongst males and females is considered in a group of patients from civilian and hospital practice and compared with figures of other countries. The initial diagnosis apparently made in many cases failed to indicate ankylosing spondylitis. Associated factors in the ætiological sense are not important. Mention has been made of the thoracic involvement, the effect of climate, Neisserian infection and tuberculosis. As regards pregnancy, it was noted that the disease often became manifest for the first time during pregnancy and thus differed from rheumatoid arthritis. In 8% of cases there was a family history of the disease.

The anatomical site of the initial symptoms compares with that found by other observers.

The erythrocyte sedimentation rate and the blood proteins are dealt with. The results of some important estimations in 20 cases are shown and considered in some detail. These also agree with findings of other authorities. The X-ray findings reveal that a number of patients had no radiological signs of the disease at the first examination, but showed radiological signs after being observed

for years. The importance of the changes in the sacro-iliac joint is stressed.

Diagnosis is stressed in the prodromal or preradiologically evident phase, as also is the importance of early diagnosis of the disease, when it is possible for successful therapeutic measures to be employed.

We believe at present that the disease is an entity and not rheumatoid arthritis of the spine.

X-ray therapy is the chief therapeutic tool and has changed the entire outlook for these patients. We have not considered the importance of the orthopædic contribution to the cure of deformity—namely, cup arthroplasty and spinal arthroplasty—which is altering the outlook for many hitherto hopelessly deformed patients whose disease has burnt itself out.

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Reports of Cases.

THE BICIPITAL SYNDROME.[1]

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In this short paper it is proposed to give the histories of three cases of sprained shoulder, in which the main lesion at operation proved to be, in one case, a partial rupture of the long tendon of the biceps with the ends adherent to the groove, and in the two other cases dislocation of this tendon from the groove.

Case I.

T.G.H., aged forty-eight years, a shearer, was first examined on August 23, 1948. His right shoulder had been injured eight months previously when the handpiece of the shearing machine locked, and to prevent the cable from flying about and injuring the others he grabbed the cable and his arm was violently twisted in internal rotation. He complained of continuous aching on top and in front of the shoulder and over the supraspinatus area of the scapula.

On examination, the patient had a full range of movement in the shoulder. The right biceps was weak and wasted. The tendon was tender in the groove. The supraspinatus muscle and tendon were tender, the capsule was tender and felt thickened in front. X-ray examination revealed slight widening of the acromio-clavicular joint, but no other abnormality. The patient had been on half pay for a long time and was anxious to do light work. It was thought that this might help his recovery. A note was made that operation on the tendon might be necessary, and the insurance company was so informed. He was not examined again until December, 1948, three months later. He could get no light work and returned to shearing, picking out the easier sheep. Owing to aching at night he had had to give up work. On December 6 his main complaints were aching in the supraspinatus and infraspinatus muscles and their insertions. He continued with massage, infra-red irradiation and graduated exercises below the threshold of pain, with varying signs and symptoms, until February 3, 1949, when he was sent for regional X-ray therapy, which apparently reduced his pain, and on April 22 his shoulder seemed much better. There was some tenderness over the bicipital groove, and a peculiar check in the scapular movements was noted as the arm passed from 110° of elevation to 80° in the sagittal plane. He had a severe attack of influenza early in May and complained that it had made his shoulder very sore. On May 19 he complained of aching behind the shoulder blade and in the side of his neck. On examination of the patient, the biceps tendon and groove were very sore, and it hurt him when he brought the extended arm backwards and upwards as in bowling a cricket ball. A bicipital click was noted.

At operation on May 24, 1949, the biceps tendon was found to be partially ruptured at the upper and lower end of the groove. The ends were adherent to the groove and the unruptured portion was rough and frayed. The intra-articular portion was removed, the outer lip of the groove was elevated and the tendon was sutured in the interval and also fixed to the transverse ligament with silk.

His post-operative progress was satisfactory, with increasing comfort and range of movement until June 16, 1949. He then had pain in the posterior scapular region, worse at night, and the pain extended up the neck and behind the right ear. Progress with regard to the scapulo-humeral joint was good. Most of his discomfort seemed confined to the posterior scapular region. He returned to light work, and his condition was reviewed on February 9, 1950. He had a good range of movement with some pain in the region of the rhomboids.

Comment.

It appears in this case that the damage to the long tendon of the biceps was only a part of a severe wrench to the scapulo-thoracic and scapulo-humeral joints. The operation to fix the tendon has removed the bicipital syndrome, but not the traumatic fibrositis, which may be a precursor of arthritis in the joint.

Case II.

W.R.Q., aged thirty-four years, was a carrier handling superphosphates, wheat and other farm produce and equipment. He was first examined on March 1, 1949. He stated that on January 5, 1949, he had fallen off a stationary truck. He partly saved himself by grabbing a hurdle with his right hand, and thought he may have twisted and pulled his right shoulder before his shoulder struck the ground. It hurt at the time and then seemed all right. He worked for a month, but the shoulder became very tired at the end of the day and ached at night.

On March 1 he complained of aching and pain coming down the outer side of the biceps to the elbow, and of pain and weakness when he attempted to lift a weight above waist level (he had no trouble up to that height), and pain on twisting his arm outwards and a constant ache at night.

On examination of the patient slight wasting of the deltoid and slight tenderness of the acromio-clavicular joint were found. There was alteration of scapulo-humeral rhythm, with a catch of pain at 80° of abduction. He complained of pain on external rotation and full internal rotation. The supraspinatus muscle was tender, as also was the posterior portion of the rotator cuff. He

[1] Read at a meeting of the Australian Orthopædic Association, Adelaide, May, 1950.

had massage and radiant heat for a week and was sent for X-ray examination.

On March 8 scapulo-humeral rhythm was normal. The supraspinatus muscle, tendon and insertion were tender. X-ray examination revealed no abnormality. The supraspinatus signs and symptoms had greatly decreased by March 29, and treatment by ionization was stopped and graduated exercises were substituted.

On April 12 it was noted that the long head of the biceps tendon was tender to pressure and clicked in the groove. The patient returned to the country and reported again on May 3, when all signs and symptoms were confined to the biceps tendon in its groove. A fortnight later there was no pain, but he complained of a catch on external rotation with the arm extended. On June 8 he stated that the clicking of the tendon had increased and had become painful. The tendon could be felt to move and click. Operation was recommended. He decided to return home and try to persist with work.

The attempt was a failure, and he asked for the operation, which was performed on July 14. The bicipital tendon was found, after some difficulty, dislocated medially. The groove was full of adhesions. The tendon was divided as near the origin as possible and sutured into the groove and to the transverse ligament with silk. The end was brought down and sutured over the transverse ligament.

After operation he had a fair amount of oozing and considerable pain for several days. At the end of a fortnight there was much improvement, and he was discharged from hospital and instructed gradually to increase the use of the arm. Improvement was maintained in comfort and range of movement until December 8, when the shoulder seemed normal and he returned to continue his work as a carrier.

Comment.

Apart from pain down the outer side of the biceps, the lesion of the bicipital tendon was not manifest until the supraspinatus symptoms and signs lessened to an extent which allowed free use of the arm. Then tenderness of the tendon, clicking on external rotation with the arm extended, and a catch at 80° and pain to 110° of elevation of the arm in the sagittal plane became evident.

Case III.

A.L.H., aged forty-five years, a naval storeman, was first examined by one of us in November, 1945. He gave the history that he had received the full weight of a bundle of blankets on his outstretched right arm. Something went "click" in his right shoulder, and he was unable to lift his arm from his side for some time. His signs were typical of a partial tear of the supraspinatus. X-ray examination revealed no abnormality and there was a tender thickened area below the tip of the acromion, and tenderness was noticed at the insertion of the supraspinatus. He was not examined again until July, 1948, when he stated that after December, 1945, his shoulder, apart from twinges of pain when working above shoulder level, had not worried him until June 17; on that day he took the weight of a heavy crate on his right forearm with the palm upwards. He felt a sudden sharp pain in the front and outer side of his right shoulder. This was followed by a dull ache, until his arm was jerked by the lever of a freezer door on June 25. When he was examined on July 12, aching was present in front of the shoulder and in the middle of the biceps. The aching was worse at night, and he was unable to rest on his right side.

On examination of the patient, tenderness was present in the long head of the biceps, and a click and grating were noted in the bicipital groove. All tests supported a diagnosis of bicipital tendinitis. Treatment with rest and heat was advised, with a note that operation might be necessary.

The patient was examined again two months later. He had done no work and had had three weeks' massage and radiant heat therapy and eight weeks' short-wave therapy. When examined he complained of aching some distance lateral to the long tendon of the biceps, and the results of bicipital tests were not very convincing. There was very little grating. A combination of capsulitis and bicipital tendinitis was suggested. Manipulation under "Pentothal" anæsthesia was carried out with a full range of movement except for slight limitation of internal rotation.

In January, 1949, tenderness was present over the bicipital groove, and he complained of "pins and needles" in the hand after use.

He was not examined again until June 22, 1949. He complained that his shoulder ached all the time, and that he could do things with the elbow by his side, but found it too painful if the elbow was raised from the side. There was tenderness at the posterior superior margin of the joint, and pressure here set up tingling in the hand. The biceps groove and tendon were tender, and all tests confirmed the diagnosis of bicipital syndrome.

At operation on September 2, the biceps tendon was over the lesser tuberosity and out of the groove. The groove was deepened and lipped, the tendon was roughened and sutured in place with silk. The intraarticular portion was not removed. Apart from a minor coronary attack there were no post-operative complications.

His progress in range of movement and comfort was satisfactory until November, when he had an attack of gastric influenza. After that movements became more restricted and painful. His shoulder was manipulated under "Pentothal" anæsthesia in mid-December, 1949. A full range of movement was obtained after the yielding of several fine adhesions. Progress was not satisfactory and five weeks later the shoulder was again manipulated under "Pentothal" anæsthesia. A full range of movement was obtained without effort and without adhesions. Most of his pain was behind the acromion. Only slight tenderness was noticed over the bicipital groove, and no click was observed to suggest buckling of the tendon in the joint. In many ways his condition when he was last examined fitted in with a diagnosis of mild periarthritis as described by Moseley. On February 2, 1950, his condition improved and he was fit for work.

Comment.

When the patient was examined in July, 1948, his signs and symptoms were typical of a subluxating bicipital tendon. Two months later restricted movements and rest concealed the syndrome. His general health was not good —he suffered from chronic sinus trouble and repeated attacks of indigestion. Operation was indicated in July, 1948, but was not performed until September, 1949. There was much wasted time and physiotherapy.

Discussion.

Moseley (1945) states that there are three bicipital syndromes: (i) tendinitis and tenosynovitis, (ii) partial and complete rupture of the tendon, (iii) recurrent subluxation and dislocation of the tendon.

Our interpretation of the bicipital syndrome is that it consists of a group of symptoms and signs peculiar to a pathological state of the tendon relative to the groove.

The symptoms and signs found constantly in these cases are: (i) aching in front of the shoulder with pain referred along the outer side of the biceps to the elbow, more intense when resting after use; (ii) tenderness over the length of the bicipital groove; (iii) pain with a scapular catch between 80° and 110° when the arm is elevated and lowered in the sagittal plane. This is present to a lesser extent when the arm is elevated and lowered in the coronal plane; whereas with supraspinatus tendon involvement the reverse has been the case.

The click in the case of the dislocating tendon can be felt and heard, and is sometimes accompanied by pain as the arm passes from external to internal rotation, as when the patient is performing the movements of bowling a ball overarm. The click was present, but not so definite, in the case of the partially ruptured biceps tendon. This is somewhat similar to Abbott and Saunders's tests:

> After full abduction of the shoulder, the arm being held in complete external rotation, is slowly brought down to the side in the plane of the scapula. A pal-

pable, audible and sometimes painful click is noted as the biceps tendon, now forced against the lesser tuberosity, becomes dislocated from the groove.

These signs are similar to those produced in cases of partial rupture of the supraspinatus tendon.

Yergason's sign localizes pain over the bicipital groove when resistance is offered to supination of the forearm with the elbow flexed. This sign was not present in these cases, but was elicited in two other cases which were regarded as of subacute peritendinitis, the condition clearing up with physiotherapy.

When a shoulder joint is sprained several structures are injured in varying degrees, and it is difficult to decide which, if any, structure should receive operative attention. These patients are seldom seen in the early stage, and have often been rested for a prolonged period with the shoulder in the adducted, internally rotated position. It seems that if progress is not satisfactory after a period of physiotherapy (two months) followed by manipulation, a decision should be made whether the supraspinatus, the biceps tendon or both need surgical interference. The possibility that both tendons are affected should be considered when one or the other is exposed.

The shoulder has given us many syndromes—the cervical disk, *scalenus anticus*, costo-clavicular and cardio-vascular syndromes, subacrominal bursitis, calcification with or without partial and complete rupture of the supraspinatus or the latter alone, the bicipital syndrome, periarthritis, capsulitis and brachial neuritis. They are all real, and it is difficult not to vote for the more recent and popular one and overlook the older ones.

This story of only three cases of proven abnormality of the long tendon of the biceps is presented with all its shortcomings. No anatomical observations were made concerning the supratubercular ridge of Meyer, except that no spur was seen or felt. The groove appeared to be reasonably deep. We cannot answer the question whether the long bicipital tendon glides in the groove or the humeral head glides over the tendon in the groove, or whether a combination of these movements takes place. Nor can we say that the accepted procedure of removing the intraarticular portion of the tendon will ultimately be regarded as a harmless mutilation.

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Reviews.

THE LIFE AND DOCTRINE OF LORD LISTER.

WE are well enough acquainted with the standard set by Dr. Douglas Guthrie, Lecturer on the History of Medicine in the University of Edinburgh, in previous contributions dealing with his subject to feel some assurance that his resolve to produce a biography, which already seemed to have been covered adequately by other writers over the last twenty-five years, must have been inspired by his acquisition of fresh material or from his conviction that Lister's doctrine of the antiseptic principle needed presentation in a different light. A persual of this latest account[1] should convince even the most sceptical and fastidious critic that his effort has been worth while. True disciples of Æsculapius, whatever their vintage, are sure to derive benefit from further contemplation of Lister's character and of his exemplary method of research, the successive steps of which led up to the final enunciation of his great discovery in 1867.

In one important respect, however, this small book differs from its predecessors; throughout the narrative one cannot fail to observe the technique of the trained medical historian in his unerring choice of such landmarks in past history as will serve to build up an appropriate background for the subject to be presented. Furthermore, attention has been paid to the difficult problem of sustaining a smooth chronological sequence from beginning to end of the story; and thought has been given to the selection of suitable illustrations, most of which are strictly germane to the accompanying text, and are appearing for the first time in any publication.

It seems unnecessary to go into any detail in the description of a biographical sketch with which most people are tolerably familiar, but there is a section in the latter part of the book dealing with the gradual acceptance and development of Lister's new doctrine on the Continent and in the United States of America. In 1886, a rigid hospital discipline was laid down by a Dr. Gustav Neuber to be followed in his own operating theatre at Kiel. He demanded disinfection of the skin with mercuric chloride solution; all caps, gowns, aprons and rubber boots to be worn by the surgeons must be first sterilized; instruments and accessories must be sterilized by boiling and then placed in a solution of carbolic acid; all dressings must be sterilized before being applied to open wounds; the number of spectators in the theatre must be limited and all must undergo the same preparation as the operating team. If there is any significance in this account of German hospital routine, it would seem to suggest that very few enlightened surgeons were religiously following Lister's doctrines, and that it took nearly twenty years before the modern aseptic technique was established in practice.

It is safe to predict that most surgeons who can find time to read this book will agree that Dr. Guthrie has produced a work that is by no means redundant. After all, we cannot learn too much about a man whose original ideas have proved so vital to humanity, particularly when the information is based upon well authenticated facts, and the material is presented for us in a systematic and agreeable manner.

[1] "Lord Lister: His Life and Doctrine", by Douglas Guthrie; 1949. Edinburgh: E. and S. Livingstone, Limited. 8" × 6¼", pp. 142, with illustrations. Price: 15s.

SEROLOGY WITH LIPID ANTIGEN.

THE firm establishment of serology in departments of clinical pathology dates from the introduction of the complement fixation test for the diagnosis of syphilis by Wassermann in 1906. It was soon found that this test was not specific in the bacteriological sense, since the "antigen" could be obtained from normal organs of several species of animal, and difficulty in interpretation soon became apparent with the occurrence of "biological false positive" reactions. Believing the complexity of the test to be responsible for these false positive reactions, Kahn in 1925 introduced a simpler precipitation test, and this test has since gained wide popularity, especially in the United States of America. However, "false positive" results were still obtained and during the last twenty years Kahn has devoted much time to the elucidation of their biological significance. By modification of the temperature and time of incubation and the concentration of sodium chloride, Kahn found that positive results could be obtained with all human and animal sera. In any particular normal individual the serological pattern obtained with this "universal reaction" was relatively constant. The present book, "Serology with Lipid Antigen"[1] consists of a study of these universal reactions with lipid antigen. It comprises four sections. Two of these are concerned with the serology of syphilis, using the Kahn test, and they should prove valuable for those who are engaged in the performance of serological tests for syphilis, and for those who interpret such tests. The other two sections are concerned with broader aspects of the biological significance of serology with lipid antigen, particularly with Kahn's "universal reaction".

Any attempt to reveal the biological significance of the bacteriologically non-specific serological reactions for syphilis is welcome. Kahn regards the positive results obtained with syphilis, and in various other diseases (leprosy, malaria) as quantitative and qualitative alterations from the universal reaction. He regards the universal reaction as evidence of the production of auto-antibodies to normal tissue lipids. The altered serological pattern in syphilis and other diseases is explained by an increased

[1] "Serology with Lipid Antigen: With Special Reference to Kahn and Universal Reactions", by R. L. Kahn, M.S., D.Sc.; 1950. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" × 6", pp. 344. Price: 64s. 6d.

liberation of lipids accompanying the tissue-destroying processes and by the liberation of tissue lipids qualitatively different from those usually present. As with most other hypotheses which invoke the formation of auto-antibodies, the experimental evidence marshalled for the antigenicity of the tissue lipids, and for the altered antigenic quality of lipids released in syphilis, is unsatisfactory. Nevertheless, the views presented by Kahn are of interest as a genuine attempt, on the part of one who has devoted most of his working life to the study of the serological reactions in syphilis, to discover the mechanism underlying these reactions.

The book is well-produced and there are good author and subject indexes.

OTO-LARYNGOLOGICAL TREATMENT IN THE CONSULTING ROOM.

IN the third edition of "Office Treatment of the Nose, Throat and Ear" A. R. Hollender retains his artificial classification of diseases into two categories and does not bring into the scope of the manual those which require hospital attention.[1] He maintains that it is not unfair to state that "office" treatment now comprises the larger part of the management of diseases of the specialty. Unlike several recent contributors to journals, he considers that, although the amount of surgery has been somewhat reduced, the scope of otolaryngology has been enlarging.

New developments in therapy have rendered obsolete numbers of operations and procedures, and in the production of this edition it has become necessary to delete some of the text and many parts have been amplified. The book, throughout, has been brought thoroughly up to date even to the inclusion of the most recent antibiotics and antihistamine drugs.

As before, there are two sections. The first gives a general survey of available therapeutic measures and operative procedures which can be undertaken at the consulting rooms. The second part is devoted to the treatment of the various diseases of the ear, nose and throat suitable for office management. At the end of each chapter are a short evaluation and a list of references.

The chapter on nutritional management has been completely rewritten and gives a valuable survey of avitaminosis and vitamin therapy. Indicative of trends in modern thought is the inclusion of a new chapter on the psychosomatic approach to otolaryngology. The final chapter, also a new one, gives a very good general discussion on the subject of headache and points out that no more than 5%, or perhaps 10%, of headaches have their origin in sinus disease.

Dr. Hollender's book, so far as its limits allow, is very sound and informative. It is well illustrated and is a handy book of reference which should have a place in every otolaryngologist's library.

SOVIET PSYCHIATRY.

"SOVIET PSYCHIATRY", by Dr. Joseph Wortis, is based on Russian papers and one or two text-books published up to 1949, and information supplied by Dr. Stuart Mudd, Chairman of the American-Soviet Medical Society, who visited Russia in 1946.[2]

It would seem that the problems which engage Russian psychiatrists are much the same as those with which western psychiatrists are familiar. The devastation of war led to serious lack of accommodation in the western provinces and occupied areas. There are ten major scientific research neuro-psychiatric institutes, with between thirty and forty beds each for patients under special investigation. The whole medical course from the preliminary sciences takes six years and 100 hours are devoted to psychiatry and 138 hours to neuropathology. Two thousand physicians practise as psychiatrists, with a ratio of 1 to 100,000 of the general population, which may be compared with one psychiatrist to 60,000 in New South Wales. The Soviet five-year plan for medicine, 1946-1950, includes an extensive programme for psychiatry—earlier detection of psychoses, more vigorous and better treatment, and lowering of the death rate from tuberculosis in mental hospitals. On the preventive side, sex education, vocational adjustment and health instruction are to be given prominence.

We are told very little about the results of research in neurology and psychiatry in the U.S.S.R. Dr. Wortis refers to investigations on the functions of the frontal lobes in perception, nature of hemisphere dominance, mechanism of speech functions, relationship of dream content to aphasic and frontal lobe lesions, and the psychophysiological functions of certain "silent" areas. Treatment of mental and nervous disorders seems to follow along much the same lines as elsewhere and great emphasis is placed on the preventive and therapeutic value of work.

Finally, or rather primarily, it seems that psychiatrists in Russia have to pay at least lip-service to Marxist doctrine. Heredity and constitution are reckoned as insignificant in comparison with environment—the psyche is essentially the reflection of the outside world. In an appendix in which Dr. Wortis summarizes a paper by E. T. Chernakov (1948), "Against Idealism and Metaphysics in Psychology", the following provides a good example of principles professed by Soviet scientists: "It is possible to rise above the bourgeois morality of capitalist society only by using as a basis the morality of the most progressive class—the proletariat. But no matter how much one desires to do so, it is impossible to rise above proletarian morality, because there is no other more progressive than that."

THE ANTIHISTAMINES.

THE antihistamines are a comparatively new group of drugs now in common use, and doctors using them will find a mine of information about them in "The Antihistamines", by Samuel M. Feinberg, Saul Malkiel and Alan R. Feinberg.[1] This book is another publication of the Year Book Publishers, who are printing so many essentially practical works at the present time.

Based as it is largely upon the authors' own clinical experiences, the critical assessment of the various drugs is most helpful. Despite what has been written in the lay Press, the authors conclude that this group of drugs is of little use in the treatment of the common cold or asthma. The greatest benefits from their use are in such conditions as hay fever, urticaria, angioneurotic œdema, certain dermatoses and motion sickness. Besides their practical application, full details of the chemistry and pharmacology as well as the toxic effects of the drugs are given, and as a list of some 586 references is appended, the writers have delved deeply into the spate of recent writings on this subject. The complexity of the various trade names used for these drugs is confusing to doctors who have to prescribe them, and this book will help them to prescribe the most efficacious preparation for each specific malady, and prevent them from using perhaps the preparation which has been lauded most by the representatives of the various drug houses.

CARBON MONOXIDE POISONING.

THE answer to the controversial question whether carbon monoxide produces chronic poisoning depends upon the interpretation given to the word "chronic". In his book "Chronic Carbon Monoxide Poisoning", Dr. Aage Grut proves to his own satisfaction the existence of such a syndrome which he states develops in a characteristic manner, following moderate exposures to carbon monoxide for some length of time.[2] "By moderate exposures are meant exposures which perhaps are too mild to cause symptoms in immediate connection with the exposure, and not severe enough to produce severe acute poisoning." Most of the symptoms are subjective and some are similar to those of acute poisoning: the author states that it has not yet been possible to find any objective criterion of chronic poisoning.

[1] "Office Treatment of the Nose, Throat and Ear", by Abraham R. Hollender, M.Sc., M.D., F.A.C.S.; Third Edition; 1950. Chicago: The Year Book Publishers, Incorporated. 8" x 5½", pp. 620, with many illustrations. Price: $7.50.

[2] "Soviet Psychiatry", by Joseph Wortis, M.D.; 1950. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 332. Price: 53s. 9d.

[1] "The Antihistamines: Their Clinical Application", by S. M. Feinberg, M.D., S. Malkiel, Ph.D., M.D., and A. R. Feinberg, M.D.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" x 4½", pp. 300. Price: $4.00.

[2] "Chronic Carbon Monoxide Poisoning: A Study in Occupational Medicine, with a Danish Summary", by Aage Grut; 1949. Copenhagen: Ejnar Munksgaard. 9½" x 6", pp. 230. Price: 12s.

In regard to the "normal" carboxyhæmoglobin percentage, Dr. Grut asserts that in non-smokers a figure of five or more, and in smokers a figure exceeding ten, must be taken as a sign of abnormal exposure to carbon monoxide. The tobacco-smoking experiments as described seem rather unscientific.

Despite the statement that determination of carboxyhæmoglobin in the blood is essential before it can be stated that a subject is suffering from the effects of carbon monoxide, the author apparently does not insist on this estimation for diagnosis of chronic poisoning. In addition to the symptoms there must be proof of repeated exposures to the gas as ascertained by the detection of an abnormal amount of carboxyhæmoglobin, or of carbon monoxide in the air of the workplace, or by examination of the working processes or by a history of acute poisonings. Whilst acute poisoning is not an essential preceding factor in the development of chronic poisoning, there should not be a history of severe acute poisoning (that is, unconsciousness).

Most of the author's clinical observations were made on drivers of producer gas units in Denmark. Several case histories are published, but in a number of instances the diagnosis is open to question: in only a few cases are figures given of the percentage of carboxyhæmoglobin or of the amount of carbon monoxide in the air.

With regard to the differential diagnosis the author maintains that a distinction can be made between recurring acute carbon monoxide poisoning, the sequelæ of severe acute poisoning and chronic poisoning: the effects of other toxic substances, constitutional neurasthenia and overwork also have to be excluded.

This publication has probably suffered to some extent in the translation from the Danish, but improvements in the method of presentation of the subject, and a rearrangement of certain sections seem desirable. The reader's first impression is one of some confusion and a consciousness of the need for revision of the text. The tables have not been presented in a uniform manner, there are several typographical errors and a serious fault is the absence of an index.

MANAGEMENT OF OBSTETRIC DIFFICULTIES.

A NEW edition of Titus's book on obstetric difficulties follows soon after the last because of recent developments in obstetric practice.[1] As stated in the preface Greenhill, Eastman and Titus conferred over certain classifications in order to obtain greater uniformity than in the past. Consequently acute and chronic nephritis are classified under the cardio-vascular system and hypertension is listed under the toxæmias. Toxæmias are divided into two groups, namely, acute toxæmias and chronic hypertensive vascular disease.

Some additions include the use of protein concentrates in hyperemesis, the Smith regime in the treatment of threatened abortion and toxæmia, and lumbo-dorsal splanchnicectomy in the treatment of malignant hypertension. The terminology of types of *placenta prævia* is simplified and only two are described, namely, total and subtotal. The use of the newer antibiotics is discussed in the treatment of puerperal infection and as prophylaxis following intrauterine manipulations.

The subject of X-ray pelvimetry is shown to be more accurate but also more complicated than external measurements, its chief value lying in the estimation of the degree of pelvic contraction. Credé's manœuvre is now condemned in favour of early manual removal of the placenta and the prophylactic use of penicillin. It is rather surprising to find bougies and bags still being used to induce labour.

Early ambulation is now stated to result in a lower incidence of thrombosis and not to increase the incidence of pelvic disorders, in contrast to views expressed in earlier editions in which early rising was given as a cause of uterine prolapse. "Natural Childbirth" and relaxation are discussed, but Titus considers "the Grantly Dick Read teachings have much to commend them if they are not expected to be infallible".

Rubella and its relationship to congenital defects are discussed and the observation is made that any virus disease in the first trimester can cause similar congenital defects. Warning is given of the possibility of cretinism resulting from thiouracil treatment for hyperthyreoidism and also of similar ill effects from treatment with radioactive isotopes. In *erythroblastosis fœtalis* the use of exchange transfusions and desensitization of the mother by Rh hapten are described. The chapter on asphyxia is well set out and the value of oxygen given to the mother to relieve anoxæmia in the fœtus is mentioned.

Titus considers that the total maternal death rate is still too high and that many deaths are preventible, but that the new developments of the past five years give every promise of better results in the future.

[1] "The Management of Obstetric Difficulties", by Paul Titus, M.D.; Fourth Edition; 1950. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 9½" × 6½", pp. 1062, with 446 illustrations, some of them coloured. Price: £7 7s.

"THE SPRINGS OF CONDUCT."

SIR JOHN PARSONS is a man who has deserved well of his country and of all mankind, in the fields of clinical ophthalmology, optics and the mathematics of optics. He has always been something of a philosopher, too. Twenty-five years ago a remark was made to a young graduate, in reply to a question as to Parson's merits as a teacher of ophthalmology: "He's too transcendental." At the time, this seemed heresy to his admirer, and in truth the comment was rather mean, for why should not a man try to look beyond the horizons of his specialty, in an attempt to find out "why", as well as "how". But it is one thing for a man to philosophize about his specialty and quite another thing to lay down the law about another specialty. "The Springs of Conduct",[1] which Parsons terms a neuro-psychological study, seems to reflect the author's insufficient study of modern psychology.

Parsons circles neurologically around the psychologist's square; his knowledge of psychology is obviously superficial. Freud is damned with faint praise and with irrelevant criticism of some of his followers.

While we do not consent that man shall not live by bread alone but by every word of Freud, nevertheless Freud occupies a position in psychology analogous to that of Newton in physics and Harvey in physiology; physics and physiology have gone a long way since the days of Newton and Harvey, but they are the rocks upon which the edifice is built. So with Freud; anyone who says to the contrary, simply does not know what he is talking about.

[1] "The Springs of Conduct: A Neuro-psychological Study", by Sir John Parsons, C.B.E., F.R.C.S., F.R.S.; 1950. London: J. and A. Churchill, Limited. 7¼" × 4¾", pp. 116. Price: 7s. 6d.

MEDICAL PHOTOGRAPHY.

So few books have been published on medical photography that "An Introduction to Medical Photography", by Josephine Hunt, will make an immediate appeal to the embryo clinical photographer or radiographer to whom the work has been primarily addressed.[2] The author has been closely associated with the leading teaching hospitals in Britain for over thirty years and is well equipped to advise those commencing in the profession on the type of work expected of him on a daily routine.

The opening chapter "The Photographer" might well be read by all interested in the subject, whereas those chapters devoted to equipment, dark-rooms and administration will be of great help only to the beginner—experienced workers may not agree with the author on many points. Methods of photographing straightforward and difficult subjects are admirably dealt with, and a whole chapter is devoted to what proves to be one of the medical photographer's most difficult assignments, the reproduction of skiagrams. It is a pity that so little space has been devoted to the photography of pathological specimens. For some inexplicable reason this subject has been grouped with copying and the making of film strips and lantern slides—subjects diametrically opposed. The illustrations to this section are disappointing; indeed, whilst the book as a whole is well produced, few of the illustrations are of a high standard. Twenty-six pages are devoted to cardiography—a subject very few medical photographers are called upon to handle, whilst only two and a half pages are given to a subject of vital importance to all employed in clinical recording—colour photography. These pages barely constitute an

[2] "An Introduction to Medical Photography", by Josephine Hunt, S.R.N., S.R.C.N., F.I.B.P., F.R.P.S., with a foreword by Sir Cecil Wakeley, K.B.E., C.B., D.Sc., F.R.C.S., F.R.S.Ed., F.R.P.S.; 1950. London: Staples Press, Limited. New York: Staples Press, Incorporated. 8½" × 5½", pp. 244, with many illustrations. Price: 30s.

introduction to the subject. With considerably less space given to cardiography and more to colour photography the volume would have had greater value to the young photographer who, nevertheless, will benefit considerably from the work.

A BOOK ON MEDICAL HANDICRAFT.

BAYLISS's book on practical procedures in clinical medicine is appearing for the first time, and is written for students, residents, registrars, and general practitioners.[1] In many ways it is a handbook on practical procedures carried out on medical patients, just as "Pye's Surgical Handicraft" is for surgical procedures. Most chapters in the book have been written by the author himself, but certain parts by others experienced in particular fields. The chapters on radiology and parenteral infusions, and sections on aspiration of joints and dietetics have thus been written by others.

The subjects covered include the following: Injections and the collection of blood, the alimentary tract, cardiovascular system, and the hæmopoietic, renal, respiratory and central nervous systems. The liver, endocrine and metabolic conditions are covered and parenteral infusions, and radiology. In a miscellaneous chapter much valuable information is tabulated including dietary requirements and tables, doses of drugs, weights and measures, incubation periods *et cetera*. The author describes the technique of minor operations and the apparatus required with such practical detail that any student or doctor completely unfamiliar with a procedure could perform it for the first time with confidence. Simple biochemical tests are described in detail, and in the case of more difficult ones usually performed in the clinical laboratory, the preparatory procedures are indicated. The physiological basis, application, and interpretation of all the tests are discussed, and ranges of normal values stated.

This book does not contain any information which is not contained in other books, and it does not deal with any subject more exhaustively or authoritatively than larger volumes. However, it does bring within one cover all the information that is likely to be required by the house doctor and general practitioner in carrying out the type of practical procedures mentioned above. Students should therefore be encouraged to study this book in the ward and the clinical side room, the house doctor should have his copy avilable in the ward, and the practitioner should always carry his copy in his bag. And more than this, the specialist physician would do well to see this book, as he will find most of the latest procedures clearly set out. Of criticism there is little that need be made. One naturally has likes and dislikes in matters such as are dealt with by this book, but on the whole the author has remained unbiased, and kept to those things that are recognized by wide usage and good authorities.

The author is to be congratulated on producing a book which is well written and edited. It is to be hoped that it will appear in further editions as time makes them necessary.

THE FOUR PILLARS OF WISDOM.

SIR SHELDON DUDLEY, K.C.B., F.R.S., Medical Director-General of the Royal Navy, 1941-1946, has found time on retirement to write an excellent book of which perhaps the main thesis is the least interesting part because of its apparent impracticability.[2] The subheading is "A Rational Approach to Healthy Education". He would like to include as the foundation of a sound education four subjects which he declares are neglected; but he regards them as the basic sciences and describes them in attractive language readily understandable even by those who have not had the advantages which he advocates for us all.

He claims that the four pillars of wisdom are semantics, psychology, statistics and logic, and that in a medical curriculum they take precedence over chemistry, natural philosophy and zoology and are indispensable in the construction of any sound educational régime. Good mental health is an essential qualification for a happy useful life and, in order to overcome the prevalent slavery to the emotions which is the root cause of social misbehaviour, all real education should have a larger scientific component than is included even in an orthodox scientific education in the schools today. The principles and methods of science should be inculcated before the data and theories: the four pillars of wisdom should be foundational. Children should be equipped to think independently of herd-imposed creeds and dogmas and to form values by the rational use of their own mental machinery with as little interference as possible from bias, emotional distortions and other irrelevances. This educational aim is unattainable until words and symbols are understood clearly, social phenomena are measured accurately and discussions and conclusions conform to the rules of formal logic. Those conditions, in turn, will be relatively futile without sufficient knowledge of psychology to provide useful facts concerning the mechanism of the brain and motivation of behaviour so that an individual is in the position not only to understand the attitude of the other fellow, but also to have a sound knowledge of himself.

Sir Sheldon Dudley has had a distinguished career and has taught himself all that he required to know of the four basal sciences. It is apparent that he commenced with a brain superior to most and that he has cultivated it beyond the ability of most, and his exposition of his "whimsy" is convincing and delightful with many evidences of erudition and sagacity. He is in a strong position to say what he means directly and forcefully and he has done that very thing, but he has not stopped to consider the wisdom of trampling down other people's beliefs and ramparts which for them represent what the worship of reason means to him. He has overstated the position, but he has provided raw mental pabulum for those who can think.

[1] "Practical Procedures in Clinical Medicine", by R. I. S. Bayliss, M.A., M.D. (Cambridge), M.R.C.P.; 1950. London: J. and A. Churchill, Limited. 8½" × 6", pp. 545, with 62 illustrations. Price: 25s.

[2] "The Four Pillars of Wisdom: A Rational Approach to a Healthy Education", by Sir Sheldon F. Dudley, K.C.B., F.R.S.; 1950. London: Watts and Company, Limited. 7" × 5", pp. 268. Price: 8s. 6d.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Liver Injury: Transactions of the Eighth Conference, April 28 and 29, 1949, New York, New York", edited by F. W. Hoffbauer; 1950. New York: Josiah Macy, Junior Foundation. 9" × 6", pp. 164, with many illustrations. Price: $1.60.

The liver lobule, the function of the hepatic artery, massive liver necrosis, the role of the liver and kidney in circulatory homœostasis, the metabolic behaviour of the eviscerate rat, liver glycogen and the protection of liver cells, and the locus of the beginning of dietary cirrhosis are discussed by nineteen persons.

"Conference on Problems of Aging: Transactions of the Tenth and Eleventh Conference, February 9-10, 1948, and April 25-26, 1949", edited by N. W. Shock; 1950. New York: Josiah Macy, Junior Foundation. 9" × 6", pp. 260. Price: $3.75.

The 1948 conference dealt with what may be described as general problems of geriatrics; the 1949 conference included reference to experimental work on animals.

"Biological Antioxidants: Transactions of the Fourth Conference, December 8-9, 1949, New York, N.Y.", edited by C. G. Mackenzie; 1950. New York: Josiah Macy, Junior Foundation. 9" × 6", pp. 184, with some illustrations. Price: $3.25.

A conference of sixteen members and nine guests who discussed: (*a*) ions and radicals in biochemical processes; (*b*) methyl oxidation and the formation of formaldehyde; (*c*) chain and one-step reactions in relation to the mechanism of catalase action; (*d*) application of physiological antioxidants; (*e*) tocopherols in hæmolysis and liver damage; (*f*) the effect of antioxidants on the metabolism of linolenic acid by acrodynic rats; (*g*) the vitamin *E* activity of tocopherylhydroquinone and tocopheryliquinone.

"Blood Clotting and Allied Problems: Transactions of the Third Conference, January 23-24, 1950, New York, N.Y.", edited by J. E. Flynn; 1950. New York: Josiah Macy, Junior Foundation. 9" × 6", pp. 228, with many graphs. Price: $3.00.

Sixteen members and eight guests discussed *inter alia* such subjects as vitamin *K* and dicoumarol therapy, various anticoagulants, coagulation, the prothrombin test and prothrombin assay.

The Medical Journal of Australia

SATURDAY, APRIL 14, 1951.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

"FAMILY DOCTOR."

AN event of the greatest importance to every member of the British Medical Association is the publication by the Parent Body of *Family Doctor*, a health magazine for the public. The main object of the British Medical Association is the promotion of medicine and the allied sciences. Of all aspects of medicine the most important deals with prevention. Medical practitioners by and large know what preventive medicine means and understand the extent of its ramifications; most practitioners, consciously or unconsciously, practise it every day. This does not say that there is no need for a closer adherence to its principles or for a more intense desire to put them into practice. That is for discussion on another occasion; the point to be emphasized at present is that the prevention of disease cannot be effected without the complete cooperation of every man, woman and child in the community. This will not be possible unless people know how to keep well, and, of course, try to do it. They can learn how in many ways. The most effective way probably is from the talks that they have with their own family doctor in their own homes or in his consulting room. (This is why the new magazine was given its name.) The one drawback about this is that people generally have to be ill before they go to see the doctor. Other means of discovery are provided by occasions such as "Health Week", by radio talks such as are given over the national network of the Australian Broadcasting Commission by the "spokesman of the B.M.A." and by printed information such as that produced regularly by the Department of Health in South Australia. The health magazine sold to the public has the psychological advantage that, provided it is sufficiently attractive, people have to seek it rather than sit back and have something served to them and are possibly on that account in a receptive mood. The American Medical Association has for many years had its magazine *Hygeia* (it is now known as *Today's Health*), and its value has never been in doubt. The Parent Body has taken a logical step which will surely meet with the approval and, we hope, gain the support of every member of the Association.

The first number of *Family Doctor* bears the date April, 1951. It has an attractive cover on which is displayed a young auburn-haired mother holding aloft a robust infant, complete with napkin and three teeth. The picture has "health" written all over it. A great deal of attention has been given to the layout of the pages and the illustrations have been distributed in and around the letterpress by someone who knows his business. The pictures illustrate and embellish the articles and we know that everyone loves a picture book. The point is that the production has entertainment, as well as educational, value—an enormous advantage. The book opens with an introductory letter from Dr. Hugh Clegg, Editor of the *British Medical Journal*. He has something to say about the objects of a health magazine and about the type of article that will be published in *Family Doctor*. An important point is that the production will keep clear of medical politics. This is as it should be. "It will take no part in any controversy in which the British Medical Association may be engaged on medical organization, or on the payment of doctors. But in order that you may understand how a doctor works, and how to make the most of his care and advice, we shall publish from time to time articles showing how doctors live and work, and play their part in keeping us healthy." The editor of *Family Doctor* is Dr. I. Harvey Flack, an experienced journalist and author, who has for some years been a member of the editorial staff of the *British Medical Journal*. The contents of the first issue and the way in which it has been presented to the public augur well for its future success.

In welcoming this new publication we commend it to the attention of Australian practitioners. Its price is small—one shilling a copy—and it will appear every month. Every doctor should have at least one copy of this magazine for use by patients in the waiting room. If succeeding numbers are like the first—and there is every reason to suppose that they will be—most doctors will want to read it themselves before they make it available to their patients. Some arrangement should be made for the display of this magazine on the public bookstalls of Australia.

THE RANGE OF ACTIVITIES OF A MEDICAL ASSOCIATION.

WE may classify men and women into groups which will vary according to the particular human activity that we have in mind. Thus we have people who believe in fairies and those who don't, people who go fishing and those who don't, people who like Gorgonzola cheese and those who don't. And so on. We also recognize those who are graduates in medicine and those who are not, medical practitioners who are members of the British Medical Association and those who are not, members of the Association who understand and are content with it and those who grumble and never fail to find fault.

The last-mentioned group of grumblers and fault-finders acquire their discontent because they do not understand. From time to time we hear of members or even of groups of members of one or other of the Australian Branches who want to know why certain moneys are sent on a

per capita basis to London by the Branches. Time and time again different activities of the Association in England are discussed, but the grumbling member asks: "What do I get for this money?" He wants a tangible or visible equivalent for what is paid in respect of his membership. We all know, or should know, what the Association stands for and what it tries to do. The first thing to remember is that the Association extends throughout the whole of the British Commonwealth and that those who are members can, in virtue of their membership, claim a closer kinship with their widely separated colleagues than they could otherwise claim. And in this disjointed and highly strung world, as we know it to be, a feeling of kinship is of the greatest value. But apart from this, we remember what the Association does in special ways with its series of special journals, its inquiries into special branches of medical knowledge and education, and its efforts to assist overseas members who go to the Old Country in search of opportunities for post-graduate study and training. The recent establishment of the magazine *Family Doctor* is referred to elsewhere in this issue. The member of the Association in Australia profits by all these ventures, but he cannot see the defined equivalent that the grumbler would be glad to hold in his grasp.

Apparently the British Medical Association is not alone in having members who look for explanations and reassurance. The American Medical Association has seen fit to publish an editorial article entitled "Dues in the American Medical Association".[1] The American Medical Association is an enormous body—the issue of its journal in which the article appeared is stated on the cover to have exceeded 150,000 copies. It may do us good to learn what this great association spends in some of its far-flung activities. First of all we may point out that the headquarters office of the Association employs more than 800 persons. The building in North Dearborn Street, Chicago, is an object lesson in organization, and every Australian doctor who travels to the United States should, if possible, include in his programme a visit to the American Medical Association. We read that thousands of dollars are set aside each year to offset the loss incurred in the publication of its nine special journals, more thousands are used to underwrite the "Quarterly Cumulative Index Medicus". These two activities are of untold value to the medical profession of the whole world, and the members of the American Medical Association pay for them. The Association has had to underwrite a loss of $70,000 on the recent edition of its "American Medical Directory". The laboratories which test the various products submitted to the scientific councils cost approximately $100,000 a year to operate. "The Council on Medical Education and Hospitals has been spending up to a quarter of a million dollars a year to advance medical education standards; the Council on Pharmacy and Chemistry, the Committee on Research, the Council on Physical Medicine and Rehabilitation and the Council on Foods and Nutrition alone have budgets amounting to approximately $300,000; health education costs the Association $175,000 a year; the Bureau of Investigation spends more than $20,000 to expose quackery, and the Bureau of Legal Medicine requires more than $75,000." There are many expenses for activities of other kinds not covered by the figures quoted. Those which have been reproduced show that growth of a medical association carries with it added responsibilities and duties.

As the population in Australia increases, the medical profession of this country will increase and the Branches of the British Medical Association will grow in size. This will be a slow growth, and what is necessary is that the sense of responsibility of the medical profession shall increase with its growth in numbers. What is really needed is that the profession shall anticipate its burdens; if this is done they will not be so heavy as if they are left to be picked up when they have become consolidated. This country will never be so populous as the United States, but it will be faced with some of the problems with which the medical profession in that country has to deal. At present the Australian Branches of the British Medical Association lean quite heavily on the Parent Body. As time goes on they will have to ease their leaning and be more creative in thought and action than they have been. This does not mean that those whom we have called the grumblers will see a smaller *per capita* payment sent to England. It will mean that more will have to be paid by members for what is done in Australia. Even today the fact that the Federal Council is limited by a *per capita* payment from the Branches of twenty-one shillings a year is absurd. It is time that the restriction of the amount to this sum was removed. Like one well-known commercial undertaking in Australia, the Branches in this country may well proclaim: "While I live I'll grow." They must be prepared to add: "And I'll be happy to pay for that growth."

[1] *The Journal of the American Medical Association*, January 6, 1951.

Current Comment.

DYSTROPHIA MYOTONICA.

The study of rare diseases is sometimes spoken of with a certain tolerant air, as if it was interesting but not useful. This is, of course, a mistaken attitude, for there has never been a time like the present when new methods of study open out fresh fields in which the harvest of clinical usefulness may be gleaned at any time. Further, when the rare disease is of a familial or hereditary type it possesses an added interest and likely importance, for genetic studies have a significance which cannot be gainsaid, as a glance back over the pages of this journal for the past few years will show. J. E. Caughey and J. Brown, of New Zealand, have taken advantage of an unusual wealth of material relating to *dystrophia myotonica*, and have studied the disease in ten families in Auckland, which has a population of 275,000.[1] Their interest lay chiefly in the endocrine system, which has in the past attracted the attention of series of observers, though few investigations have been made with modern techniques. As they point out, glandular dystrophies are here associated with a disorder of muscular function, a combination which exists in other conditions, including thyreoid disease. Caughey and Brown present in their article a brief clinical account of seven male and two female patients with fully developed *dystrophia myotonica*, on whom they have carried out an endocrinological investigation. They have examined a series of fifteen patients with the fully developed disorder and five with cataract alone, and from this series is drawn the group specially studied. All the patients in the present group had noticed a difficulty in relaxing the grasp for some time previously, and weakness and wasting of the muscles were apparent.

[1] *The Quarterly Journal of Medicine*, October, 1950.

Among other signs noted were those related to hypogonadism, cataract and cardiac abnormalities, such as bundle branch block and auricular flutter, and a small pituitary fossa was found on radiological examination. The body growth was within normal limits, and hair growth was disturbed. All the male patients had premature frontal baldness. Though other writers do not seem to have laid stress on the radiological changes in the skull, they were a striking feature of this series. The sinuses were enlarged in a majority of patients, but the pituitary fossa was small. The authors suggest that pituitary activity may have been present at an earlier age. Frontal hyperostosis was seen, with some increased density of other bone, and in several patients the mandible was lengthened. Recession of gonadal function occurred in all the patients after puberty, and also after the onset of muscular wasting and myotonia. Testicular biopsy on several patients in an advanced stage of the disease showed well-marked atrophic changes. The excretion of follicle-stimulating hormone in the urine was estimated in four male patients and one female, and was found to be raised. No clinical signs suggesting disturbed adrenal function were detected, though a certain degree of lethargy and asthenia was noted. The tests of adrenal function performed were estimation of electrolytes, tests of carbohydrate metabolism, and estimations of excretion of 17-ketosteroids. Slight changes in the levels of electrolytes in the blood were not significant, and water excretion tests in three cases gave normal indices, though there all patients showed a somewhat delayed diuresis. Glucose and insulin tolerance tests gave normal results, but two patients showed delay in return of normal concentration of glucose in the blood. The excretion of 17-ketosteroids was uniformly low in all nine cases. No evidence of disturbed parathyreoid function was detected, but two patients had definite signs of myxœdema. The authors conclude that the hypogonadism which is a striking feature of the complete syndrome is not due to pituitary defect, for the gland produces follicle-stimulating hormone. In advanced stages of the disease there is evidence that the pituitary is working subnormally, and myxœdema is probably secondary to this depression of pituitary activity. Caughey and Brown therefore conclude that the primary glandular defect is atrophy of the androgenic cells of the testes and the adrenal cortex.

This is an interesting study, and although the numbers are small the results are suggestive, and invite further work which might well provide information of value in a much wider field.

THE USE OF ION EXCHANGE RESINS.

THE control of certain kations has been found a difficult problem in some clinical states in which alterations in their level in the blood may have serious effects. Examples of such states are œdema and anuria. In commercial processes synthetic ion exchangers have been used for a number of years for such purposes as the softening of water and the isolation of specific anions and kations in the preparation of pharmaceutical substances. Samuel H. Hay and J. Edwin Wood, in an article on the use of kation exchange resins in the treatment of congestive cardiac failure, state that substances of this kind have been used in sugar refining as far back as 1896, and that the first synthetic resin was produced in 1934.[1] A few years ago anion exchange resins were given clinical trial in the treatment of peptic ulcer, with the object of reducing acidity, and work on orally administered resins in animals showed that non-toxic substances could be produced which reduced the amount of sodium in the alimentary tract. Following this work studies were published of the concentrations of sodium, potassium and calcium in the urine and fæces when a kation exchange resin was administered over a prolonged period. The next step was investigation of the effectiveness of this resin in the treatment of cardiac failure and ascites due to hepatic cirrhosis. Further study of the effects in animals showed that no toxic effects appeared, and that there was no evidence of absorption of other essential elements from the intestine. The interest which has been centred for some time on the effects of disturbances of the levels of sodium and potassium in the body fluids, has led to the devising of complicated methods of adjustment of these disturbances in such dangerous conditions as anuria, due to post-operative or post-traumatic interference with renal function. Among these have been trials of peritoneal dialysis and even of the artificial kidney, but there seems to be some promise in the simpler technique of the exchange resin. Hay and Wood have used an ammonium kation resin which can take up both sodium and potassium. The polymer resins so far used are of either the ammonium or ammonium and potassium forms, and have sulphonic or carboxylic side chains which exchange hydrogen or ammonium ions for other kations. Ten patients were studied in this series for periods ranging from a few days to many months. One had chronic nephritis; three others had cirrhosis of the liver, and the remainder cardiac failure. The authors were careful not to attribute amelioration of the patients' condition to the use of the resin alone when other factors might be important. For example, they found that the help of simple bed rest in favouring diuresis was undeniable. Digitalis intoxication was observed in one patient and was thought to have been influenced to some extent by hypopotassæmia. The authors conclude that the administration of an ammonium kation resin reduces both sodium and potassium in the urine, and that the reduction in sodium absorption from the bowel is effective in the treatment of congestive failure and ascites. An ammonium-potassium resin does not produce hypokalæmia, and no untoward results were observed such as those due to lack of salt. One useful effect appears to be the production of mild acidosis, which is associated with an effective chloride level in the plasma and assists the action of mercurial diuretics. Hay and Wood think that these resins have an indication in the treatment of heart failure in persons who find difficulty in persisting with a diet poor in sodium.

Another aspect of the same subject is dealt with by J. R. Elkington, J. K. Clark, R. D. Squires, L. W. Bluemle, junior, and A. P. Crosley, junior, who present a preliminary report on the treatment of potassium retention in anuria with a kation exchange resin.[1] They remark that the hazards of oliguria and anuria can be lessened by dialytic methods, but these are difficult to apply, and have in themselves dangers of technique. Hyperkalæmia is known to be associated with severe disturbances of cardiac function, and thus the risks of suppression of renal function are increased. The successful use of resins for the reduction of œdema induced the authors to try these polymers in renal insufficiency, since the removal of excess potassium was a logical objective. They therefore treated three patients in this way; one was suffering from nephrosclerosis and oliguria, and two had a lower nephron syndrome following incompatible blood transfusion. Their results show that lowering of the elevated serum potassium level followed the use of an ammonium kation resin, and that if vomiting hinders its use by mouth, significant amounts of potassium may be removed by its use by rectum, though its action by this route is variable. They point out that conservative treatment of patients with reversible anuria should include restriction of water intake, preservation of the total body electrolytes as judged by blood sodium levels, avoidance of acidosis, and a high carbohydrate intake so as to lessen protein breakdown and release potassium. These measures may be reinforced by the administration of aluminium hydroxide and calcium to prevent tetany. The addition of the use of a kation resin is a promising measure, which may prove its value as an agent likely to control the complication of hyperkalæmia in this dangerous emergency.

[1] *Annals of Internal Medicine*, November, 1950.

[1] *The American Journal of the Medical Sciences*, November, 1950.

Abstracts from Medical Literature.

PHYSIOLOGY.

Conversion of Carbon Monoxide to Carbon Dioxide in the Intact Animal.

R. T. Clark, junior (*The American Journal of Physiology*, September, 1950), reviews the rather indirect evidence which has accumulated concerning the ability of animal tissue to metabolize carbon monoxide. He then reports results of his own experiments in which the carbon monoxide consumption was measured both in a closed chamber and by a radioactive method by which the carbon monoxide used was labelled with C^{14}. Turtles were exposed in a closed container to low concentrations of carbon monoxide for periods ranging from eight to thirteen days. By measuring the change in carbon monoxide concentration in the container during the period, it was found that the turtles had consumed from 30% to 52% of the carbon monoxide. Mice were similarly exposed to low concentrations of carbon monoxide for four-day periods. The drop in carbon monoxide concentration during this period showed that the mice were consuming carbon monoxide at the rate of 0·24 cubic millimetre per hour. In another similar experiment with mice the radioactive isotope C^{14} was used in the carbon monoxide of the carbon monoxide air mixture. The radioactivity of the respired carbon dioxide showed that the mice were oxidizing carbon monoxide to carbon dioxide at the rate of 0·28 cubic millimetre per hour. This was in agreement with the gas analysis experiments with mice and turtles, thus indicating that the carbon monoxide consumed was actually due to the burning of carbon monoxide and carbon dioxide. The rate of burning of carbon monoxide to carbon dioxide by the mice was ten times greater than would be expected by a straight line extrapolation from isolated muscle in 80% carbon monoxide and 20% oxygen.

Oxygen Content of Inspired Air and Total Lung Volume.

E. Peyser, A. Sass-Kortsak and F. Verzar (*The American Journal of Physiology*, October, 1950) state that body plethysmography on man and on rabbits shows that exercise or air with a decreased oxygen content will cause an increase in total lung volume as well as an increase of tidal air and respiration rate. During exercise or lack of oxygen the tonus of the inspiratory muscles is increased, so that the thorax rests in an inspiratory position. Experiments were carried out to ascertain whether the increase in total lung volume was correlated with the increase in volume or rate of respiration. Measurements of changes of total lung volume during respiration were carried out with a body plethysmograph on rabbits and cats narcotized with urethane. Lack of oxygen (5% to 8% carbon dioxide) regularly increased the lung volume; carbon dioxide (2% to 10%) in the inspired air had no such effect, in spite of increased ventilation. Lack of oxygen mainly increased the number of respirations; carbon dioxide mainly affected the respiratory volume. There was no quantitative correlation between the increase of the total lung volume and the increase of the rate, the increase of the volume of respiration (tidal air) and the increase of the respiratory minute volume. The factor which influences the total lung volume is the lack of oxygen. Lung volume increases as the oxygen content of the inspired air decreases.

Blood Coagulation and Hæmorrhage following Irradiation.

R. L. Rosenthal and A. L. Benedek (*The American Journal of Physiology*, June, 1950) state that the thrombocytopenia produced by irradiation has generally been considered the most important causative factor in post-irradiation bleeding, although Allen, Jacobson and associates have recently reported finding an anticoagulant similar to heparin in the blood of irradiated dogs and rabbits. The authors report that rabbits exposed to single doses of total body irradiation with X rays from 200*r* to 1000*r* showed a blood coagulation impairment characterized by thrombocytopenia, diminished clot retraction, increased clotting time of recalcified plasma, and increased anticoagulant effect of both added heparin and toluidine blue on the clotting time. These changes can be attributed chiefly to the diminished platelet count and function following irradiation with X rays. No free or excess heparin was demonstrated in the blood following irradiation as evidenced by the lack of significant prolongation of the blood-clotting time and negative results from the toluidine blue titration test. The rabbit, in contrast to man, the dog and the guinea-pig, shows an inconspicuous hæmorrhagic response following X-ray exposure. The consideration of species differences in the clotting and hæmostatic mechanisms and their response to irradiation with X rays is of importance in understanding and developing treatment of post-irradiation hæmorrhage and applying the results of animal experiments to man.

Permeability of Frog Skin by Means of Radioactive Tracers.

R. E. Lux and J. E. Christian (*The American Journal of Physiology*, July, 1950) report experiments in which radioactive tracers were used to measure the permeability of frog skin. The permeability of the excised skin from the frog *Rana pipiens* is shown to vary widely among animals. Experiments with radioactive iodine indicate that this variation may be as extreme as 65% from the average response of 12 animals. The permeability of frog skins to iodide ion is increased approximately twofold by treating the skin with a saturated dextrose solution. The diffusion of I^- through frog skin proceeds approximately four times as rapidly as does Na^+. It is suggested that the frog skin bears a simulated positive charge, thus permitting the easier passage of I^-. Treating frog skin with different astringents was found to increase the permeability of the skin. This finding was independent of the orientation of the skin, the nature or concentration of the astringent, the type of tracer used, or the means of applying the astringent. Radioactive tracers offer an excellent means of studying permeability problems. Such a method was found to be rapid, precise and convenient. The authors point out that in the literature it had been suggested that astringents would probably decrease the permeability of membranes.

Total Body Water in Man.

J. M. Steele, E. Y. Berger, M. F. Dunning and B. B. Brodie (*The American Journal of Physiology*, August, 1950) state that the measurement of total body water in living man has become possible in recent years by estimation of the degree of dilution of deuterium oxide and tritium oxide in the body, but few measurements have been carried out because the methods involve costly and tedious procedures. More recently, the degree of dilution of antipyrine has been shown to be an accurate estimate of body water. The compound is evenly distributed throughout the water of tissues in both dogs and humans; it is relatively non-toxic; it is degraded slowly in man, and the method for its estimation is simple and accurate. Its volume of dilution in man agrees well with that of deuterium oxide. The total body water in a group of male and female subjects was measured as the volume of dilution of antipyrine in the body. The proportion of water in 31 female subjects averaged 45% of body weight and in 51 male subjects 53% of body weight. Variations in the proportion of water reflect for the most part variation in body fat.

BIOCHEMISTRY.

Insulin Destruction.

R. H. Broh-Kahn *et alii* (*Archives of Biochemistry*, June, 1950) have studied the effect of the composition of the diet on the restoration of the liver insulinase activity of the fasted rat. During a forty-eight-hour period of refeeding following a seventy-two-hour fast the insulinase activity per unit weight of liver was restored equally well by a diet of high carbohydrate content, a diet of high fat content and a balanced stock diet. The diet of high carbohydrate content produced a greater increase in the total insulinase activity of the liver than did that of high fat content or the balanced stock diet.

I. Minsky *et alii* (*Archives of Biochemistry*, October, 1950) have shown that liver extracts contain a substance which inhibits the in-vitro inactivation of insulin by insulinase. Muscle extracts contain less of this inhibitor. Intravenous injections of large amounts of the inhibitor have no apparent effect on the blood sugar regulatory mechanisms of small animals.

Cholesterol.

G. Popjak and M. Beeckmans (*The Biochemical Journal*, May, 1950) have shown the synthesis of cholesterol and fatty acids in the rabbit fœtus by rapid incorporation of deuterium from the body water into these substances and by the utilization of C^{14}-labelled acetate for these syntheses. They concluded (*a*) that all fœtal cholesterol is obtained by synthesis within the body of the fœtus, (*b*) that while the fœtal extrahepatic tissues synthesize cholesterol, they do not degrade it, and (*c*)

that the fœtal liver synthesizes as well as degrades cholesterol, but the amount degraded is only one-half of the amount synthesized on the twenty-eighth day of pregnancy. Synthesis of both saturated and unsaturated fatty acids in the fœtal liver and extrahepatic tissues (embryonal adipose tissue) has been shown. The fœtal placenta synthesizes all lipids studied, but it also absorbs these from the maternal circulation. The maternal placenta appears metabolically inert, at least towards the end of pregnancy. Since there was no apparent destruction of fat in the fœtus, it is inferred that the primary source of energy in the fœtus must be carbohydrate and that growth is characterized not so much by increased rate of synthesis as by reduced rate or absence of degradation. The synthesis of cholesterol and fatty acids in the non-lactating mammæ of pregnant rabbits has been shown.

Vitamin D.

B. MIGICOUSKY AND A. EMSLIE (*Archives of Biochemistry*, October, 1950), using radioactive calcium given orally and intramuscularly in experiments on the deposition of calcium in rhachitic and non-rhachitic chick tibiæ, have shown that vitamin *D* probably does not exert a direct effect on the mineralization of bones of chicks.

Thiourea.

J. SCHULMAN (*The Journal of Biological Chemistry*, October, 1950) has used tracer techniques and shown that thiourea administered to a rat is oxidized to sulphate in the thyreoid gland. It has been suggested that this compound prevents the formation of organically bound iodine by saturating the mechanism of the thyreoid gland, which under normal conditions oxidases iodide ion.

Bone Marrow.

K. DINNING *et alii* (*Archives of Biochemistry*, June, 1950) have studied the effects of aminopterin treatment on the peripheral blood cell counts, bone marrow cell counts and bone marrow choline oxidase activity of adult chickens. The daily injection of one milligramme of aminopterin reduced peripheral leucocytes and total marrow cells to about 50% of control values in four days; peripheral erythrocytes were reduced to 53% of control value after thirteen days of aminopterin treatment. Bone marrow from control chickens exhibited choline oxidase activity, while marrow from aminopterin-treated chickens did not exhibit choline oxidase. It is suggested that aminopterin inhibits bone marrow choline oxidase by displacement of folic acid from a position in the enzyme system.

Folic Acid.

J. R. TOTTER *et alii* (*The Journal of Biological Chemistry*, September, 1950) have incubated liver homogenates from folic-acid deficient and replete chicks with carboxyl-labelled radioactive glycine and studied the incorporation of the radioactive carbon into the proteins and phospholipides. The proteins and phospholipides of the livers from deficient chicks were found to be only one-half to one-third as active as those from the folic-acid-fed chicks. The addition of folic acid *in vitro* was found to elevate slightly, but probably not significantly, the uptake of radioactive carbon from glycine. Carrier isolations were conducted on the supernatant after precipitation of the proteins. The results indicate that the livers from folic-acid-fed birds are capable of transforming glycine to serine much more rapidly than those from deficient birds. The activities of creatine, uric acid, xanthine and thymine isolated from livers of replete chicks were found to be considerably higher than those isolated from the livers of deficient chicks. Adenine and guanine were found to have slight or no activity, while uracil was moderately active in both preparations.

Hypophysectomy.

I. GESCHWIND *et alii* (*Archives of Biochemistry*, August, 1950) have demonstrated that hypophysectomy produces a decrease in the ribonucleic acid concentration of rat liver. Growth hormone injection into hypophysectomized animals results in a maintenance of the liver ribonucleic acid concentration near normal.

Ascorbic Acid.

S. K. ELSTER (*The Journal of Biological Chemistry*, September, 1950) has studied the collagen content of the lungs, liver, kidneys, spleen, heart and skeletal muscles of male weanling guinea-pigs made scorbutic. Comparable determinations were performed in normal age and weight controls. There was a significant decrease of the collagen content of the lungs, liver and kidneys as compared with age controls, but no significant difference from normal animals of the same weight. A relative (percentage) increase of the collagen content of the heart and skeletal muscle was noted. The total collagen content of the heart was not significantly different from that of the age controls, but was greater than in the weight controls. The collagen content of the spleen was unaffected. In no instance was less collagen found in the tissues of scorbutic guinea-pigs than in normal animals of the same weight.

Muscular Dystrophy.

H. P. JACOBI *et alii* (*Archives of Biochemistry*, June, 1950) have examined the enzymes of rabbit with incipient muscle dystrophy. Malic, succinic and lactic dehydrogenase, cytochrome oxidase, fumarase and adenosinetriphosphatase activities in gastrocnemius muscle homogenates from such animals were the same as in homogenates from normal animals. The same was true for uricase and adenosinetriphosphatase activities of liver homogenates from normal or dystrophic rabbits. It was shown that α-tocopherol phosphate can inhibit succinic dehydrogenase, malic dehydrogenase and choline esterase.

MEDICINE.

Nerve Gases.

COLONEL J. R. WOOD (*The Journal of the American Medical Association*, October 21, 1950) discusses medical problems in chemical warfare. He states that nerve gases are the most dangerous gases available for mass attack. They may gain entrance to the body through the lungs, the skin, the eyes or the gastro-intestinal tract. The symptoms induced are due to the inactivation of cholinesterase. This leads to accumulation of acetylcholine in both central and peripheral nervous systems and to acetylcholine poisoning. Symptoms of muscarine and nicotine poisoning develop. A curare-like flaccid paralysis may occur. Symptoms are progressive; in a few minutes pin-point pupils, bronchoconstriction or nasal discharge may become evident. Pain in the eyes and photophobia follow. Atropine relieves some of the symptoms. Dilatation of pupils with atropine or homatropine usually relieves the headache. Larger doses of gas cause cyanosis with bronchospasm, confusion and unconsciousness. Low blood pressure, bradycardia and cardiac arrest may occur. Intravenous or intramuscular administration of atropine may relieve these symptoms. One-thirtieth of a grain of atropine sulphate, given every few minutes until cardio-respiratory symptoms are relieved, is advised. Repeated smaller doses follow. Muscle spasm and twitchings and clonic and tonic convulsions are more serious symptoms. Flaccid paralysis may develop. Respiratory paralysis requires artificial respiration. Contaminated clothing must be removed, and the skin cleaned with an alkaline solution (5% to 10% sodium carbonate solution).

The Incubation Period of Tuberculosis.

A. POULSEN (*Acta tuberculosea Scandinavica*, Fasciculi III-IV, 1950) has studied the incubation period of tuberculosis, where this was a known quantity, in 36 cases culled from the literature and in 65 of his own. The incubation period was about forty days in the great majority of cases. In 45 cases, when the exposure had lasted for less than fourteen days, the shortest possible incubation period was twenty-eight days and the longest possible fifty-five days.

Intermittent Excretion of Tubercle Bacilli.

E. STRANDGAARD (*Acta tuberculosea Scandinavica*, Fasciculi III-IV, 1950) found among 404 patients with active pulmonary tuberculosis that the excretion of tubercle bacilli was discontinuous in 52. When there was undoubted cavitation of the lungs and when bacilli had previously been found in the sputum, it was sometimes impossible for several months to demonstrate bacilli in the sputum despite energetic search for them.

Erythema Nodosum Provoked by Sulphathiazole.

S. I. ROLLOF (*Acta tuberculosea Scandinavica*, Supplementum XXIV, 1950), in the course of an extensive investigation of the ætiology of *erythema nodosum*, found that the incidence of this allergic reaction in the skin was higher when sulphathiazole had been administered either therapeutically or experimentally. No evidence was found that *erythema nodosum* is the result of supersensitiveness to sulphathiazole, and in some cases this could be ruled out. *Erythema nodosum* may occur in association with sulphonamides other than sulphathiazole, but the incidence is very low.

Medical Societies.

AUSTRALIAN ORTHOPÆDIC ASSOCIATION.

THE annual general meeting of the Australian Orthopædic Association was held on May 17, 18, 19 and 20, 1950, at the Royal Adelaide Hospital.

Flail Lower Limb.

E. E. PRICE (Melbourne) read a paper entitled "The Management of the Flail Lower Limb following Poliomyelitis" (see page 540).

W. L. MACDONALD (Sydney), in opening the discussion, said that he agreed with the need for early institution of an orthopædic programme for the victim of poliomyelitis; but while the flail limb could probably be recognized three to six months from the onset of the disease, less serious paresis would merit treatment over at least two years. When active physiotherapy ceased, regular supervision was still necessary to prevent deformity of the active and passive type. In the latter category, he had been troubled by the occurrence of knock-knee deformity associated with external rotation of the tibia, which made splint fitting difficult. Experience and experimentation as the result of two wars had evolved artificial limbs which were serviceable and comfortable to their wearers. In dealing with a flail lower limb in the child or adult, the orthopædic surgeon was prone to be satisfied with some slight modification of the Thomas caliper. Dr. Macdonald believed that the poliomyelitis victim, often handicapped by other muscle weakness apart from his flail limb, was worthy of all the ingenuity of the skilled prosthesis maker. In correction of the deformities associated with the flail foot, Dr. Macdonald considered that the Dunn type of stabilization would answer nearly all demands. Adequate backward displacement would control foot drop, and if sufficient bone was removed from the under-surface of the astragalus, lateral and antero-posterior stability was also achieved.

A. V. MEEHAN (Brisbane) was glad to note that tendon transplantation for controlling the foot had not been mentioned in the paper. He thought such procedures had no place in the treatment of flail foot. He had seen disabling calcaneus result from tenodesis of the *tibialis anticus* and *peroneus brevis* to cure drop foot in children.

J. B. COLQUHOUN (Melbourne) discussed leg lengthening. He said that he had succeeded in gaining satisfactory correction in some cases, but he agreed that all methods were beset with many difficulties and probably made the limb more prone to fracture. When some control of the hip remained, he thought that arthrodesis of the knee joint was well worth while in selected cases.

D. J. GLISSAN (Sydney) expressed disappointment that the central aspect of the problem had not been discussed in detail. Not infrequently the question whether the limb was any good at all had to be answered. For some patients amputation was certainly advisable. Dr. Glissan also referred to waste of physiotherapy on limbs which would never function. The surgeon should try to estimate which muscle groups were worth saving and direct that attention be concentrated on them.

The Bicipital Syndrome.

ALEXANDER JUETT and R. D. MCKELLAR HALL (Perth) presented a paper entitled "The Bicipital Syndrome" (see page 549).

J. B. COLQUHOUN (Melbourne), in opening the discussion, said that he was in complete agreement with the statement that in most traumatic injuries of the shoulder, apart from rupture of head of the biceps, many structures were damaged. Lesions such as those described were difficult of diagnosis in the early stages, and the optimum time for operation was often passed before the true pathological basis was realized. Nevertheless, he had been astonished at the capacity of the shoulder joint to recover good function without operation. Some general toxic factor was often overlooked when the prognosis after joint injury was being assessed.

N. H. MORGAN (Sydney) reported the operative results in three cases, in which recurrent dislocation of the biceps tendon had been proved at operation. In all, the tendon was divided high up and transplanted into the short head. Two patients were cured, but the third still complained of pain.

E. E. PRICE (Melbourne) commented that any operation on the shoulder of a patient aged over forty-five years was unlikely to give an entirely satisfactory result.

Calcinosis.

A. R. HAMILTON (Sydney) read a paper on calcinosis. He first defined the term, and said that one should visualize calcinosis as a collection of granules of calcium salts in the form of a paste or scattered throughout the fibres of some structure such as a tendon, whilst calcification might be regarded as a solid bony structure situated in some part of the anatomy. He said that calcinosis was usually described as occurring as two well-defined entities, (i) *calcinosis universalis* and (ii) *calcinosis circumscripta*. The first more frequently affected children, was widespread throughout the body and was often associated with scleroderma. *Calcinosis circumscripta* usually affected those in the higher age groups, and the condition was often confined to the terminal phalanges of the fingers and to the extensor aspects of the elbows and knees.

Dr. Hamilton discussed theories as to causation, and said that most authorities believed that there was no general disorder of calcium metabolism. He went on to describe a series of cases in which the deposit of calcium was localized to one site, or at most to two symmetrically placed sites. He first referred to the frequency occurrence of the lesions in the tendon of the supraspinatus muscle and the adjacent subacromial bursa, and said that that was prone to occur in those of relatively sedentary habit rather than in people who did heavy manual work. The outstanding symptoms and recognized methods of treatment were examined, and Dr. Hamilton expressed the opinion that continuous splintage with the arm abducted was the most uniformly successful means of relieving pain and restoring function.

Dr. Hamilton then showed lantern slides and gave brief histories of patients with deposits of calcium on the anterolateral aspects of the ankle, in the region of the internal epicondyle of the humerus, on the dorsum of the wrist, and on the flexor aspects of the thumb. The deposits had all been incised and evacuated, with complete relief of symptoms. A further case was illustrated in which calcinosis followed a fall on the shoulder. Treatment on an abduction splint for eight weeks resulted in complete absorption of the calcium and complete restoration of function. Another patient, a medical practitioner, had reported the presence of vague pain on the dorsal aspect of the proximal interphalangeal joint of the right middle finger. After a firm handshake, pain became acute, the finger and dorsum of the hand became swollen and slight fever was present. Clinically the condition resembled an acute infective process, but X-ray examination revealed a typical calcium deposit. Penicillin was given and a splint applied. After one week the symptoms subsided, and thereafter full recovery was rapid. Further cases were reported of calcinosis in relation to the greater trochanter and to the insertion of the *flexor carpi ulnaris*. In reviewing the series, Dr. Hamilton said that all cases were characterized by (i) considerable pain and tenderness at the site of the lesion, (ii) the absence of any other area of calcinosis, and (iii) the complete absorption of the calcium deposit with treatment by rest in some cases and incision in others. Referring to ætiology, Dr. Hamilton said that he felt that at least two factors were constant: (*a*) the tissues involved probably had their vitality impaired by some trauma or preexisting pathological condition; (*b*) infection by some hæmatogenous toxin or organism was present. In the latter group, characterized by severe pain, sudden onset and general constitutional disturbance, he thought that antibiotics should be given a fair trial.

A. V. MEEHAN (Brisbane), in opening the discussion, spoke first of calcinosis affecting the subacromial bursa. He had gained the impression from Dr. Hamilton's remarks that he (Dr. Hamilton) had observed the wall of the bursa lined with calcium. Dr. Meehan himself had not encountered that condition. In the past he had been accustomed to operate when the condition was causing severe pain; but, as many surgeons had observed, he did not always find a mass of calcium which could be removed. Nevertheless, the patients were relieved of pain. He agreed with Dr. Hamilton that a high proportion of cures could be obtained by continuous rest for the shoulder by placing the arm on an abduction splint, but the method was tedious and irksome to the patient. For some time he had been accustomed to refer his patients for deep X-ray therapy, and had been gratified at the rapid relief of pain and absorption of the calcium plaque. He had seen no ill effects on the articulation as the result of that form of therapy.

D. J. GLISSAN (Sydney) said that the incidence of supraspinatus calcification fell almost invariably in the twenty-five to thirty-five years age group. He considered immobilization in abduction the treatment of choice. He drew attention to the acuteness of the onset in many cases, and described two cases with lesions in the neighbourhood of the wrist joint where cellulitis or bone sepsis was suspected.

W. L. MACDONALD (Sydney) said that recently a physiotherapist had reported to him complaining of a small but acutely tender nodule to the outer side of the interphalangeal joint of the right thumb. Discomfort had been present for two weeks; then suddenly for no apparent cause the pain had become acute. X-ray examination revealed a nodule outside the joint. The swelling was hot, tender to pressure and cystic. Operation was advised. Dr. Macdonald said that he was in complete agreement with Dr. Meehan regarding the efficacy of X-ray therapy for supraspinatus calcification with acute symptoms.

J. B. COLQUHOUN (Melbourne) described two boys with extensive generalized calcinosis.

E. E. PRICE (Melbourne) said that it was well known that deposition of calcium was often asymptomatic. Symptoms arose from the development of tension in the lesion. He could not explain the cause, but thought that infection might play a part, and in the acute cases with general constitutional disturbance, the giving of antibiotics was justifiable. In shoulder lesions aspiration with a wide-bore needle was always worthy of trial. He described two cases of calcinosis in relation to the *gluteus maximus*.

Clinical Meeting.

A clinical meeting was held, at which the following cases were presented.

Limb Inequality Resulting from Poliomyelitis.

E. F. WEST (Adelaide) presented a case of limb inequality resulting from poliomyelitis. The patient was a female, aged thirteen years. At the age of two years she had had an attack of poliomyelitis. The right leg was left almost flail; some power remained in the hip muscles, but none in the rest of the leg. At the age of thirteen years the patient had five inches of shortening of the leg. On December 21, 1949, the left leg was shortened by three and three-quarter inches, one and a quarter inches difference being left. On May 3, 1950, two weeks prior to the meeting, epiphyseal arrest of the upper tibial epiphysis of the left leg was performed by the insertion of metal staples, as suggested by Blount in a recent article in *The Journal of Bone and Joint Surgery*. Dr. West said that correction of the inequality should have been commenced earlier.

Giant-Cell Tumour of the Head of the Femur.

Dr. West then showed a male patient, aged twenty years, who had first been examined on December 1, 1937, when he complained of pain in the left hip present for two years. The pain was felt on violent movement and jarring, such as in bowling at cricket; that would cause a severe stab of pain in the perineum, and had several times caused him to fall to the ground. He was a farm worker.

On examination of the patient, slight limitation of movement and pain on all movements of the left hip joint were found. An X-ray film showed the appearance of a cyst in the head of the femur near the cortex; it was thought to be a simple bone cyst. The patient was advised to take up lighter work and to avoid heavy exercise, in the hope that natural healing would take place.

Five months later he reported an aggravation of his symptoms. On examination, he now had a limp, and there was considerable limitation of movement of the left hip joint. An X-ray film then showed "mushrooming" of the left femoral head with a fibrocystic appearance, and there appeared to be diminution of the joint space.

On May 25, 1939, biopsy was performed. A hole was bored up the neck of the femur into the head, and a portion of the head near the cortex was removed for examination. The report by the pathologist stated that the appearance was that of a "myeloid sarcoma"; he considered that the condition was a giant-cell tumour which had undergone malignant change.

On June 8, through a straight lateral incision, the upper end of the femur including the lesser trochanter was removed. After operation the patient was immobilized for four weeks on a Jones abduction frame. He was then allowed up wearing a walking caliper. He wore the caliper for nearly twelve months and then found that he could walk quite well without it, using a stick. He discarded the stick a few months later. For several years since his operation he had worked as a taxi driver, and did full work as a driver, including the carrying of heavy suitcases *et cetera*. He said that he had no disability and no pain in the hip. Examination revealed that despite the shortening his gait was good and he had a free range of hip-joint movement. Several X-ray films showed reformation of a miniature head and neck of the femur, which articulated with the acetabulum. Review of the appearances in the section by the pathologist suggested that the lesion was a giant-cell tumour, but there was no evidence of malignant change.

Quadricepsplasty.

Dr. West's next case was one of quadricepsplasty. The patient was a female, aged twenty-three years, who five years earlier had sustained compound fracture of the middle shaft of the right femur as a result of a motor-car accident. She also had a wound over the antero-medial aspect of the patella extending into the knee joint. This latter wound was sutured, and it healed without any infection of the knee joint. The shaft fracture was transverse, with considerable displacement; apposition of the fragments and satisfactory position could not be obtained by the usual treatment with extension in the Thomas splint. Ten weeks after the injury open reduction was performed. Henry's approach was used and it was found that portion of the *vastus intermedius* was interposed between the fragments. The bone ends were dissected free and apposition was obtained. No internal fixation was used. Immobilization was secured by a plaster spica, which was retained for four and a half months. By that time firm union in good position was obtained. The knee was found to be stiff in a position of slight flexion. Intensive physiotherapy and repeated manipulations under anæsthesia failed to produce any more than a few degrees of movement of the knee, although the patella was movable. The patient had four manipulations in all. In addition to fibrosis of the joint capsule, it was apparent that the quadriceps was bound down to the front of the femur.

Twenty-seven months after the date of the fracture quadricepsplasty was performed. The operation was suggested by an article by T. C. Thompson (1944) in *The Journal of Bone and Joint Surgery*, Volume XXVI, page 366. Dr. West said that essentially the operation consisted in excising the remains of the *vastus intermedius*, which was in a state of fibrosis and adherent to the anterior aspect of the femoral shaft. The rectus was isolated but not lengthened. The capsule of the joint was divided on either side of the patella, the incisions extending distally on both sides so that contracture of the capsule was overcome. It was then found possible to flex the knee to a little beyond a right angle. No attempt was made to close the capsule. The knee was fixed with a plaster slab at about 90° flexion. Knee movements were started as soon as the wound was soundly healed (eighteen days after operation). Physiotherapy was then continued with the patient's own active exercises. It took a little over twelve months for her to regain full active extension and flexion to beyond 90°. The quadriceps was well developed and there was excellent function of her knee.

Slipped Femoral Epiphysis Treated by Manipulative Reduction and Pinning.

Dr. West next showed a male patient, aged fifteen years, who had been admitted to the Royal Adelaide Hospital on June 29, 1949. One hour previously he had been pushed over by another boy and had fallen onto his side. When he attempted to get up he found that he was not able to stand and had severe pain at the inner side of the right thigh. He had had slight pain in the region of the right hip for two weeks previously. On examination of the patient, the right leg was found to be externally rotated at the hip and shortening was present. An X-ray examination revealed complete epiphysiolysis of the right femoral epiphysis. About five hours later he was anæsthetized. Reduction was easily obtained by abduction and medial rotation of the hip. No force was required. A Smith-Petersen pin was inserted across the epiphyseal line. His subsequent progress was uneventful. X-ray films at the time of the meeting showed good position; the epiphysis was still open. He had full movement of the hip joint.

Arthrodesis of the Left Shoulder Joint Performed for Deltoid Paralysis.

The next patient shown by Dr. West was a male, aged twenty years, who had contracted anterior poliomyelitis at the age of seven years, and was left with almost complete paralysis of the left deltoid and weakness of the left biceps and triceps. The scapula rotator muscles were active. He was given the usual regime of treatment, and three years later, at the age of ten years, arthrodesis of the left scapulo-humeral joint was performed. The operation was performed with the patient in the prone position with the arm hanging over the edge of the table. The incision passed along the spine of the scapula across the posterior aspect of the shoulder joint and down the upper third of the arm. The infraspinatus tendon was divided, and the fibres of origin of this muscle were peeled subperiosteally off the inferior

aspect of the scapula, the spine and the adjacent part of the infraspinous fossa. The deep surface of the acromion process was denuded, as also was the articular cartilage of the head of the humerus and the glenoid. A peg graft cut from the anterior border of the tibia was driven through a hole which was prepared passing obliquely through the head and upper part of the humeral shaft. The inner extremity of this graft lay along the under surface of the scapular part of the spine and the acromion process. The remainder of the joint was packed with spongy bone from the tibia. A plaster spica was applied with the shoulder in the optimal position.

Dr. West said that the operation had been performed ten years earlier and the result had been highly satisfactory. The patient had carried out all the activities of a normal boy and young man, including playing football. His present work was that of an ambulance attendant, and he said that he had no disability of that shoulder. He carried patients weighing up to 17 stone on a stretcher, either at arm's length or on the shoulders. His only complaint was the appearance of his shoulder when he was stripped.

Arthrodesis of the Hip Joint for Osteoarthritis with Gross Deformity of the Femoral Head.

Dr. West's next case was that of a male patient, aged thirty-seven years, who had first been examined in 1949, when he complained of severe pain and disability in the left hip. He stated that his hip trouble had commenced when he was aged seven years. At that time he was treated at the Adelaide Children's Hospital, being immobilized on an abduction frame for a considerable time. He remembered having a limp as a young man, and for twelve months before he came for examination his hip had become increasingly painful until he was scarcely able to put any weight on that leg. An X-ray examination revealed osteoarthritis of the left hip joint with gross deformity of the head of the femur. The clinical history and the shape of the femoral head indicated that the condition had commenced as Perthes's disease. There now appeared to be a cystic condition affecting the greater part of the head. It was considered that the only feasible operation would be arthrodesis; that operation was performed on August 31, 1949.

A Smith-Petersen approach was used and the femoral head was turned out of the acetabulum. The greater part of the head was found to be occupied by large cysts containing colloid material, and when that was removed there was a considerable deficiency in the head of the femur. Owing to the shape of the head it was difficult to make it fit into the acetabulum until the remaining inner part of the head had been caused to collapse into the cystic area and the acetabulum reshaped to obtain satisfactory apposition. A Smith-Peterson pin was driven across the neck and head into the firm area of ilium above the acetabulum, and extra spongy bone obtained from the ilium was packed into the remaining deficient area between the outer part of the head and the acetabulum. Further immobilization was effected by the application of a double plaster spica. After three weeks the patient was allowed to go home to be nursed there. Owing to the deficiency of the head, it was decided to maintain immobilization for a period longer than the usual fourteen to fifteen weeks. The plaster spica remained in position for five and a half months. Firm union in good position had been achieved. He had been walking for about two months at the time of the meeting, and had just discarded his stick.

Spondylolisthesis with Some Unusual Features.

Another patient shown by Dr. West was a female, aged thirty-nine years. In 1945 she commenced to have low-back pain, attributed to a fall. An X-ray examination on October 25, 1945, clearly revealed defect in the *pars interarticularis* of the neural arch of the fourth lumbar vertebra on both sides. The lateral view revealed no listhesis, but possibly slight narrowing of the intervertebral space between the fourth and fifth lumbar bodies. The films were taken in Perth where the patient was resident at that time. She had first consulted Dr. West eighteen months later on account of left-sided sciatic pain in addition to the low-back pain. She complained also of numbness in the feet and of difficulty in walking at times with weakness of the legs. Examination of the patient revealed restriction of movement of the lumbar part of the spine and absence of the right ankle jerk, although the sciatic pain was left-sided. There was some diminution of sensation in the left fifth lumbar dermatome area. An X-ray film taken at that time (February 3, 1947) revealed forward displacement of the fourth lumbar body on the fifth vertebra and narrowing of the intervertebral space between those vertebræ. The findings indicated degeneration of that intervertebral disk with a reduction of its stabilizing function. Conservative treatment was tried, by the application of a spinal brace and rest, but did not relieve her symptoms. Further X-ray films taken on October 8, 1948, eighteen months later, revealed that the listhesis had increased and that the intervertebral space had completely disappeared. The patient was still having considerable low-back pain and left-sided sciatica. Twelve days after the X-ray examination, an operation was performed; it consisted of fusion from the third lumbar vertebra to the sacrum, a curved graft from the right tibia being used, and iliac bone chips being used for reinforcement. The intervertebral disk was not explored. Good fusion was obtained.

Dr. West said that the case was of interest, in that it revealed progressive increase of the listhesis over a period of three years, associated with loss of the intervertebral disk space. It was unusual to be able to demonstrate progression of the displacement in cases of spondylolisthesis. Hitchcock (1940), in an article in *The Journal of Bone and Joint Surgery*, Volume XXII, page 1, on that subject, had made the following statement: "An extensive search of the literature has failed to reveal the records of a single case which showed any progression of the listhesis from one examination to the next." Hitchcock reported three such cases; in none of them was progression so great as in the case under discussion. Since Hitchcock's paper other cases of progression had been reported. Dr. West went on to say that in his opinion degeneration of the intervertebral disk in the patient had allowed the listhesis to take place. He stressed that point because he believed that the loss of the binding or stabilizing action of the disk was the main factor in allowing listhesis to occur and progress, an observation which was not sufficiently stressed in the literature. There was not time to discuss the question of the association of sciatic pain with spondylolisthesis, but he would enlarge a little on that subject when discussing his next case.

Spondylolisthesis Associated with Sciatica in a Young Subject.

Dr. West's final patient was a boy, aged thirteen years, who, when first examined on March 24, 1949, complained of pain in the region of the left buttock of two months' duration. He had developed a limp, and said that his left leg felt stiff. Clinical examination showed the patient to be a thin boy who had a relatively short lumbar section of the spine with the typical appearance of spondylolisthesis. Lasègue's sign was strongly elicited in the left leg. The deep reflexes were normal in both legs and there was no alteration of sensation. X-ray films revealed forward displacement of the fifth lumbar body on the sacrum. No defect in the neural arch of the fifth lumbar vertebra was visible, but the lumbo-sacral apophyseal joints were in the sagittal plane. On April 4 the patient was anæsthetized and an attempt at reduction of the listhesis was made, according to the method described by Watson-Jones. Films taken during that procedure appeared to show almost complete reduction. A double plaster spica was applied with the hips flexed to 90°; the spica was left on for three months. Films taken after its removal appeared to reveal a decrease in the displacement. The hamstring spasm of the left leg did not completely disappear, although the patient was kept off his feet for a further five months. He was then allowed to commence walking (in December, 1949). In March, 1950, Lasègue's sign was still elicited in the left leg, and there was depression of the left ankle jerk. However, he had no pain except after a fair amount of walking. It was considered then that there was protrusion of the lumbo-sacral disk with pressure on the left first sacral nerve root. The patient had reported three weeks prior to the meeting, and said that he was having tingling in the sole of the left foot which spread up the back of the left leg, and he experienced pain down the back of this thigh if he walked. Slight dulness of perception of pin prick was present in the first sacral dermatome, and Lasègue's sign was elicited on the left side.

Dr. West said that the patient appeared to have a protruded disk in association with the spondylolisthesis. He thought that the lumbo-sacral disk should be explored, and also that fusion of the fourth and fifth lumbar vertebræ and the sacrum should be performed at the same operation; but he asked for the opinion of members on that point. Much had been written about sciatic pain in association with spondylolisthesis, and on the question whether or not the sciatic pain resulted from disk protrusion or merely the listhesis. Meyerding, of the Mayo Clinic (1941), who reported in *The Journal of Bone and Joint Surgery*, Volume XXII, page 461, 80 cases with associated sciatic pain out of

a total of 745 cases of spondylolisthesis, was of the opinion that protrusion of the disk was the cause of the sciatic pain.

Tuberculous Lesion of the Left Hip.

N. S. GUNNING (Adelaide) showed a male patient, aged five years, suffering from a tuberculous lesion of the left hip. In October, 1943, treatment had been commenced by extension on a Thomas frame. In May, 1946, the boy was taken off the frame and a plaster spica was applied. In August, 1948, the plaster spica was removed and a walking caliper was fitted. In January, 1950, owing to destruction of the femoral head and the acetabulum, and to the possibility that the femur might work up the side of the ilium, thus increasing the degree of leg shortening, which was already two inches, a shelf operation was performed. A wide, thick shelf was turned down from the ilium and sutured to the great trochanter, and a wide wedge of bone was driven into the ilium above the ledge.

Dr. Gunning said that the patient was shown to demonstrate a number of points. The first was the mobility of the hip after the infection, with destruction of the femoral head and the acetabulum. The second was the result of the shelf operation, which had probably given the patient a mobile hip for a number of years until arthrodesis might or might not be necessary. The third was the shortening of the leg and the advisability of shortening the other leg; if such a procedure was advisable, the question arose when it should be carried out. Another problem was whether an attempt should be made to steady the growth of the opposite limb by epiphysiodesis. Dr. Gunning drew attention to the satisfactory state and position of the graft, in comparison with that in the case he was about to discuss; in the latter case, although a suitable ledge was turned down, it had apparently disappeared, and the limit of the ledge was too high.

Double Congenital Dislocation of the Hips.

Dr. Gunning then showed a child, aged eight years, who in May, 1945, at the age of three years, had shown all the signs of a double congenital dislocation of the hips. In an attempt at reduction, the heads could not be completely reduced. In August, 1945, at the second change of the plaster spica, a satisfactory position was obtained. In April, 1946, the plaster spica was removed; X-ray examination showed the femoral head in good position, but owing to a change resembling Perthes's disease in both femoral heads, the child was placed on a double abduction frame with slight extension. In December, 1946, X-ray examination still revealed a change resembling Perthes's disease. In March, 1947, the position was good, but the changes were still present. In June, 1947, an improvement was apparent, especially in the left hip. In the right hip the acetabulum was under-developed, as compared to the left hip, and half the head seemed lateral to the upper edge of the acetabulum. In April, 1948, weight-bearing was commenced. In August, 1948, good recovery of the heads was apparent, except for some flattening and widening of the neck of the right femur; the condition of the head was as previously described. In May, 1949, owing to the possibility of upward dislocation of the right hip, and to the child's limping and leaning to the right when taking the weight on the right leg, an attempt at a shelf operation was made. In August, 1949, some riding up of the right femoral head was seen, but most of the graft seemed to have disappeared. The final result was seen in May, 1950; there was further widening of the left femoral head, seen in the succession of X-ray films, from what was apparently a satisfactory head.

Probable Perthes's Disease of the Hip Joint.

Dr. Gunning next showed a female patient, aged eleven years, who had been admitted to hospital in November, 1949, with a history of stiffness of the left hip of eleven months' duration. In October, 1949, the X-ray appearances had suggested Perthes's disease of the hip, and a Mantoux test produced a negative result. The patient was examined privately by a radiologist, who reported on the X-ray films taken on September 30 and stated that the appearances were consistent with a tuberculous infection. Pugh's traction method of treatment was commenced. In March, 1950, an X-ray examination revealed some further destruction of the left femoral head, with irregularity and a little sclerosis. The radiologist's report favoured a diagnosis of Perthes's disease, although the appearances were not typical.

Dr. Gunning said that the case presented an interesting problem in diagnosis. Although the patient had been treated for a while as suffering from Perthes's disease, there was fairly strong evidence of some infective arthritis. She was now being treated in extension on a Thomas frame.

Arthrodesis of the Shoulder.

Dr. Gunning then showed a patient, aged fifty-nine years, who in July, 1949, complained of severe pain and limitation of movement of the left shoulder; X-ray examination revealed some osteoarthritic changes in the left shoulder joint. An operation for arthrodesis of the left shoulder was performed. The deltoid was turned down, the joint was exposed, the capsule was reflected back, and the under-surface of the acromion process was bared. The head of the humerus and the glenoid were cleared and fitted into place. The acromion was drilled through and the humerus was placed in the best position. The head of the humerus was then drilled to fit the line of the drill hole in the acromion. A graft from the leg was then fitted and driven down into the humerus, sufficient being left protruding to be forced up through the drill hole in the acromion process. The drill hole in the humerus was so placed that when the graft was in position and being driven through the acromion, it forced the head against the glenoid. The humerus was then fixed to the glenoid by a stainless steel screw. Spongy bone was placed around the head and the glenoid and the wound was closed. A plaster cast was applied a few days later. In August, owing to the size of the patient, it was found difficult to retain fixation with plaster; the cast felt very heavy. It was decided that fixation would probably be sufficient without plaster, and the cast was removed. In May, 1950, union was progressing satisfactorily; the patient had good use of the arm with no pain. Dr. Gunning said that the patient was shown to illustrate that method of fusion without plaster fixation.

E. E. PRICE (Adelaide) advocated a posterior approach, which gave excellent access and simplified the placing of the arm for arthrodesis in the optimum position. He favoured fixation with a triflanged nail rather than by a bone graft.

D. W. L. PARKER (Hobart) described a method which he had found satisfactory. A body cast of plaster was applied several days prior to operation. The shoulder joint was exposed by a sabre-cut incision, and tibial bone grafts were driven through drill holes, one through the head of the humerus into the glenoid and neck of the scapula, and a second through the acromion into the humeral head. The arm was then enclosed in a plaster cast, which was secured to the body piece.

Talipes Equinovarus.

Dr. Gunning next showed a patient, aged nine years, suffering from severe *talipes equinovarus* of both feet, the left foot being affected more than the right. The child had had a fair amount of previous treatment to try to correct the left foot, including the application of plaster casts and an inside iron and T-strap. In September, 1949, when aged seven years, the child was still walking badly on the left foot. The heel would not touch the ground by nearly three-quarters of an inch, and the child was walking on the outer side of the foot; at that time a hard callus was present, nearly two inches in length, along the outer aspect of the fifth metatarsal bone. Brockman's operation was performed, with division of the *tendo Achillis*. At operation the fascia was stripped off the *os calcis* and forwards, and ligaments and structures were carefully removed off the bony origins until it was possible to move the foot well round into flexion and abduction. The *tendo Achillis* was lengthened and the wound was closed. A plaster cast was applied. In November, 1949, the plaster was removed; X-ray examination revealed good alignment of bones; "Elastoplast" strapping was applied, but no further plaster cast. Dr. Gunning said that the case illustrated the result that followed the stripping operation in late cases when the response to treatment had been unsatisfactory.

Congenital Pseudarthrosis of the Tibia.

Dr. Gunning then showed a child, aged thirteen years, who in March, 1937, at the age of two months, had been under the care of Dr. L. O. Betts for an ununited fracture of the right leg. X-ray examination was said to have revealed a cystic condition. The child was treated in a plaster cast and a caliper. In August, 1941, the tibia was split above and below the fracture, and amorphous bone was cut away; a graft was inserted and impacted firmly. In April, 1942, a caliper was fitted; there was no sign of union. In February, 1943, there was no sign of union, and the graft had disappeared. In December, 1947, a bone graft was inserted after the ends of the tibia had been cleared; the graft was taken from the child's father. In April, 1948, during changing of the plaster cast, the wound was seen to be healed and clinically firm. In February, 1949, the plaster cast was removed and a caliper was fitted; the patient commenced walking with the aid of crutches. X-ray

examination showed satisfactory appearances. The two screws were removed under local anæsthesia. In March, 1950, the patient was walking well in the caliper.

Dr. Gunning said that the patient was shown to demonstrate the necessity of using a large double bone graft, and of being rather drastic in clearing the ends of the tibia, in cutting away amorphous bone and in packing the space in between the grafts with plenty of spongy bone. The case also showed the necessity to keep the plaster cast in position for a longer period than might be thought necessary, and when the caliper was fitted, to see that it was an excellent fit; constant supervision was necessary during that stage.

E. E. Price (Adelaide) gave warning of the danger of osteotomy to correct unilateral bow-leg. He said that that condition in an infant should always be viewed with suspicion as having narrowly missed being congenital pseudarthrosis. Dr. Price described a case in which osteotomy had been carried out when the patient was aged eighteen months, and non-union had supervened. Double onlay grafting with the use of bone from the mother was performed, and the graft united at each end but snapped in the centre. Dr. Price was hopeful that union would be obtained by a prolonged period of plantar fixation and bed rest.

D. J. Glissan (Sydney) said that the literature abounded in reports of disappointing results from operative treatment in such cases, and even when union was obtained the limb was often short, deformed and poorly adapted for function. In his opinion, early amputation was often the treatment of choice.

R. W. McGlynn (Sydney) referred to McFarland's technique, in which a by-pass tibial graft was used. No attempt was made to correct amputation at the site of the fracture, the graft being firmly implanted in healthy bone well above the pseudarthrosis and along the concave side of the tibia. He said that of eleven cases in which that type of treatment had been used, in only one had the graft failed to survive and unite to the parent bone.

Arthroplasty of the Index Finger.

Dr. Gunning's next patient was a man, aged twenty years, who had sustained a fracture-dislocation of the metacarpo-phalangeal joint of the left index finger. When he was examined in January, 1949, posterior and lateral subluxation was present. Except for about 5° of flexion he had no movement at the joint, and he was unable to flex the distal joint at all, probably owing to the stretching of the extensor tendon over the dislocated metacarpo-phalangeal joint. In August a simple Keller's operation was performed, as for *hallux valgus*, extension of the finger being carried out by a pin through its pulp. In September the plaster cast was removed and extension was stopped. At the time of the meeting the two distal joints had full active movement and the metacarpo-phalangeal joint just over 50% of active movement, but passively the joint could be flexed through nearly the normal range. Dr. Gunning said that the apparent loss of full flexion was probably due to some loss of the fulcrum effect, but the hand closed well, and gave practically normal use.

Arthrodesis of the Hip Joint.

Another patient shown by Dr. Gunning was a man, aged thirty years, who in 1943 when in the army had sustained a fracture of the neck of the femur; a Smith-Petersen pin was inserted. In July, 1944, the pin broke in the middle when the patient was alighting from a motor truck; the fracture apparently had not united. In August, 1944, the pin was removed. Owing to the extreme density of the femoral head, it took over two hours to remove portion from the head. The intention was to carry out a bone grafting operation after removing the pin. In December, 1944, a Lorenz osteotomy was performed, as the head was too dead for any other procedure to be attempted; further, it was thought that perhaps a goose-neck shape might be given to the top of the shaft to allow walking. In March, 1945, X-ray examination showed that the shaft was beginning to slip upwards. Further dislocation of the shaft was apparent in March, 1949. In Sempember arthrodesis was performed.

Dr. Gunning said that the case illustrated three points. In young people when the neck of the femur was fractured, the head was often very hard, and care had to be taken to force the distal fragment hard against the neck. That had not been done in the case under discussion, and the result was non-union. The osteotomy, although it had been taken in as far as possible, was not satisfactory because the head was in the way and the shaft did not go in under the head. In an arthrodesis the shaft had to be well cleared on the inner side, so that it could lie close enough for the top to enter the prepared bed on the ilium, and the fixation pin had to start well down the shaft, being driven inwards and upwards.

Double Arthroplasty of the Hip.

Dr. Gunning's next patient was suffering from severe ankylosing spondylitis. In October, 1947, an attempt to gain movement in the left hip was made by the performance of an osteotomy just above the lesser trochanter and the insertion of a Smith-Petersen cup on top of the femoral shaft, the shaft being displaced under the neck. Upward slipping occurred, but the result was good. In November, 1948, the patient requested that the right hip be operated on in the same way. A similar operation was attempted, except that the cup was fitted into a cavity made in the under-surface of the neck; but the operation was not so successful as that on the left hip. It gave movement, but the patient had some pain. In April, 1949, manipulation of the right hip was performed. In March, 1950, a further operation was performed. Much scar tissue and the femoral neck were removed, and the shaft was displaced inwards and upwards. At the time of the meeting good movement was present, with some pain on walking; but the condition was improving.

McMurray's Osteotomy in Osteoarthritis and Ununited Fractures of the Neck of the Femur.

Dr. Gunning then showed four patients to illustrate the results of McMurray's osteotomy. The first patient, aged seventy-two years, had in October, 1948, sustained a fracture of the neck of the femur. In February, 1949, X-ray examination revealed satisfactory progress; the pin was protruding a little. In March, 1949, owing to shortening of the neck, the pin was protruding further and causing discomfort. In April the pin was removed. In July there were signs of non-union; the patient was having pain and discomfort, with limitation of movement. Late in July McMurray's osteotomy and blade plate operation was performed. In November an X-ray examination revealed union with the shaft well situated under the head, and union apparently taking place at the old fracture site. Dr. Gunning said that the case demonstrated the value of the procedure in ununited fractures of the neck of the femur.

T. King (Melbourne) said that early in his experience with the Smith-Petersen nail he had been disappointed with the percentage of non-unions in spite of good reduction and well-placed internal fixation. In an attempt to improve matters he had employed a graft in addition to the nail. After some years he found that, contrary to expectation, aseptic necrosis of the head was more likely to occur after that procedure than when a nail was used alone. He now advocated a primary osteotomy, together with fixation by nail and plate. He described the mechanics of the operation, with inward displacement of the shaft and downward rotation of the head and neck. When that technique was employed, the incidence of aseptic necrosis of the head had been reduced to 5%.

L. Teece (Sydney) issued a warning about the blade plate. He described several cases of non-union between head and neck, which he ascribed to the mechanical fixation actually keeping the fractured surfaces apart.

B. T. Keon-Cohen (Melbourne) said that he too had had some disappointing experiences with blade plates. He had seen the plate break. Speaking of impacted fractures of the femoral neck, he said that he regretted the *laissez-faire* attitude of many medical practitioners. While in some such cases sound union undoubtedly occurred, in many disimpaction would take place.

Dr. Gunning then showed a female patient, aged sixty-nine years, who in January, 1948, had complained of severe pain in the legs and hips, worse on the left side than on the right; she also had low-back pain. She had been unable to go about for four months, and was suffering from general arthritis together with a certain amount of loss of function of the heart, which resulted in some dropsy and shortness of breath. She was bent over to nearly a right angle at the hip joints, and had to use two sticks. Her back was mobile. Severe osteoarthritis of both hips was present, worse in the left than in the right. There was some movement in the right hip, but very little in the left. Dr. Gunning said that he told the patient that he did not think anything could be done for her, owing to her general condition, and he did not advise operation, although he discussed it with her at the time. In April, 1948, the patient asked him to perform the operation because of her severe pain and inability to go about. The operation was performed that month. Dr. Gunning said that the patient was shown to

illustrate the possibilities of the Lorenz type of operation, and the result which could be gained from it. As the head was still in the acetabulum, the normal operative procedure was used; as the right-angle flexion deformity was present, care had to be taken in the bringing of the leg into the neutral position so that the shaft still remained well displaced inwards and under the head. In November, 1949, X-ray examination revealed reunion of the shaft with the head and the outer third of the shaft under the upper portion of the acetabulum.

Dr. Gunning's next patient was a man, aged seventy years, who in January, 1948, complained of severe pain in the left hip and of some pain in the right hip region. His prostate had been removed two years previously, and the presence of malignant disease had been proved pathologically. Rectal examination at that time revealed no abnormality, and in view of his history no operative treatment was advised. In June, 1949, he still had severe hip pain, and requested that something be done. No abnormality was detected on rectal examination, and general X-ray examination of the long bones revealed no secondary deposits. An X-ray examination of his left hip revealed a dense appearance rather like Paget's disease. Operation was performed. The femoral head was very dense, and the blade would not follow the line of the guide wire. The shaft was well displaced inwards and fixed. After operation the patient was able to walk well, had lost all his hip pain, could lie down with comfort, and complained only of some stiffness in the back, as he was much straighter than he had been before the operation. In November, 1949, X-ray examination revealed good position, and union taking place across from the great trochanter to the top of the shaft of the femur. Density of the head was less apparent than in the original picture.

Dr. Gunning finally showed a patient, aged sixty years, suffering from severe osteoarthritis of the left hip. The acetabulum was shallow, the head was broad and the neck was short; the conditions were unsuitable for the insertion of a Smith-Petersen cup. In September, 1949, operation was performed; a blade plate was inserted and a wedge osteotomy was carried out. The position of the shaft was satisfactory. In November, 1949, an X-ray examination revealed that union between the shaft and the great trochanter had not yet taken place. The great trochanter was rotated inwards, so that the head was slightly further out of the acetabulum than when the first X-ray film was taken. Dr. Gunning said that such rotation of the great trochanter always took place when that operation was performed, so that the osteophytic area was turned away from the edge of the acetabulum. There was a tendency to further dislocation in the case under discussion, but as the shaft was well under the head he did not think that would happen.

Correspondence.

PNEUMONIA IN POLIOMYELITIS.

SIR: I noted with interest the letter of Mr. Harry Windsor in your issue of March 3, 1951. Having recently suffered from personal experience, I should like to make some comments thereon.

I had extensive pareses involving both lower limbs, back and abdominal muscles and some pareses of both arms. My diaphragm did not function normally, and when asked to cough I, too, could only grunt.

In Mr. Windsor's case I would like to ask: (i) Was the diaphragm really functioning normally? (ii) What place does the diaphragm play in the cough and what part of the bronchial tree does the cough clear? (iii) Is the absence of cough the main cause of the atelectasis, or is the diminished excursion and consequent diminished air entry of the lungs?

About three and a half weeks after the onset of my attack I suffered an atelectasis of the lower lobe of my right lung with quite severe pleuritic pain and marked pulling of the mediastinum to the right, pyrexia and rapid pulse.

I was informed, and myself believe this was due to insufficient movement of the lung due to diaphragmatic and intercostal weakness. I was threatened with bronchoscopy. My physiotherapist had just started me on correct breathing exercises. For forty-eight hours I practised these to the utmost—result, expansion of the lung. Some days later the lung tried to repeat its performance; I again forestalled bronchoscopy. I think it interesting to record that not until nine weeks after onset did the first tiny sneeze reappear, and at that time I could cough half-volume, but no further atelectases occurred.

I would suggest that early attention to proper breathing and maximum air entry to lungs may prevent many atelectases and save reaching the bronchoscopy stage and pneumonia.

Yours, etc.,

35 Gerrale Street,
Cronulla,
March 27, 1951.

A. M. MACINTOSH.

PINK DISEASE.

SIR: We were particularly interested in the results obtained by Williams, Macdonald and Callow in their attempt to confirm Cheek's work on pink disease. Following publication of the papers by Cheek and Cheek and Hicks in 1950, the physicians of the Royal Alexandra Hospital for Children, Sydney, decided that an attempt should be made to confirm observations that seemed so important and appointed us for the task.

We have now followed 28 patients suffering from pink disease during their illness. Initial examinations were carried out on the blood of 19 patients who had been ill for one to four months and who had been given no salt in addition to their diet, and on eight children who had been given salt by their parents in amounts varying from three grammes daily for one week to five grammes daily for eight weeks. The following results were obtained.

Observation.	With No Previous Salt. (19 Cases.)	With Previous Salt. (8 Cases.)
Plasma sodium:		
Milliequivalents per litre ..	143 (Range 139–151)	144 (Range 141–148)
Milligrammes *per centum* ..	330 (Range 319–348)	331 (Range 325–340)
Plasma chlorides:		
Milliequivalents per litre ..	103 (Range 99–108)	103 (Range 100–107)
Milligrammes *per centum* ..	366 (Range 350–383)	367 (Range 355–380)
Plasma, total protein in grammes per 100 millilitres	7·2 (Range 6·4–7·9)	7·4 (Range 6·4–8·3)
Erythrocytes in millions per cubic millimetre.	4·8 (Range 4·1–5·9)	4·9 (Range 4·4–5·4)
Hæmoglobin in grammes *per centum*.	12·5 (Range 10·0–14·1)	13·2 (Range 12·0–15·4)
Hæmatocrit in volumes per 100 millilitres.	41 (Range 34–48)	41 (Range 34–46)

The estimation of plasma sodium was carried out by the method of Goldzieher and Stone (1949), chlorides by the method of Schales and Schales (1941), and proteins by the copper sulphate specific gravity method. All estimations, including the blood counts and hæmatocrit values, were made on venous blood, a small amount of dry heparin being used as an anticoagulant. The biochemical estimations were made by Miss E. A. Stobo, the hospital biochemist. By our methods the plasma sodium, chloride and total protein contents were normal in patients who had not been given salt and who had been ill with pink disease for periods ranging from three weeks to four months. In children who had been given extra salt by their parents the findings were essentially the same. There was evidence of hæmoconcentration in most of our cases.

Although we have not carried out any controlled experiment on in-patients, we have supplied measured amounts of salt in capsules to the parents of 15 patients, and they have given the children from three to nine grammes daily for periods of many weeks, while the patients were under our observation. We were unable to observe any significant alteration in the progress of the disease as compared with our controls and with our previous experience of pink disease.

Being unable to confirm Cheek's finding of an initial low plasma sodium content, we were loath to give big doses of a potentially dangerous drug like desoxycorticosterone. We

have now given it in doses of three milligrammes each second day to four patients for periods of one to four weeks without observing a significant effect on their disease. (In two cases distinct deterioration followed the use of the drug, but may have been due to respiratory infection rather than to desoxycorticosterone intoxication.)

We have failed to confirm Cheek's observations of an initial electrolyte imbalance in pink disease and of a good response to salt without, and in a few cases with desoxycorticosterone. We are at a loss to explain the simple factual variation in his and our findings of the initial plasma sodium and chloride levels. Clinical observations differ from chemical estimations in that bias may alter judgement, and the method of independent observers as used by Williams and his colleagues has much to commend it.

Yours, etc.,
D. G. HAMILTON.
CHARLES LEE.

Sydney,
March 12, 1951.

References.

Goldzieher, J. W., and Stone, G. C. H. (1949), "A Rapid Colorimetric Method for the Determination of Sodium in Biological Fluids", *The Journal of Clinical Endocrinology*, Volume IX, page 95.

Schales, O., and Schales, S. S. (1941), "Simple and Accurate Method for Determination of Chloride in Biological Fluids", *The Journal of Biological Chemistry*, Volume CXL, page 879.

THE HEPARIN PROTAMINE TEST AND ITS CLINICAL SIGNIFICANCE.

SIR: I have read with interest the paper by Dr. N. M. Gutteridge on the heparin protamine test, which appeared in THE MEDICAL JOURNAL OF AUSTRALIA on March 17, 1951. May I, however, point out that Dr. Gutteridge is in error when, in the discussion of Case IV, he states (on page 406): "The hospital authorities finally asked the parents to take the child home, as nothing more could be done for him"?

During his stay in hospital from December, 1948, to April, 1949, the boy, H.W., was a patient under my care. Although he was critically ill in the early weeks, his condition slowly but obviously improved. Ulceration of the mouth, which had been troublesome at first, had completely disappeared by mid-February, and whereas the tendency to spontaneous hæmorrhage due to minor trauma had been one of the outstanding features of the case in its early stages, this tendency was no longer evident after the middle of March, although the boy was extremely active in his bed.

The intervals between transfusions gradually lengthened, and there was evidence of a slowly increasing amount of blood regeneration taking place. The picture was, however, complicated early in April by the development of a large abscess deep in the right thigh. This was incised, and transfusions which might not otherwise have been considered necessary were given before and after operation. Healing was satisfactory, and there was no post-operative hæmorrhage.

The prognosis given to the parents, although guarded as to the duration of the illness, was optimistic as to the final outcome.

The boy was in fact removed from hospital at the parents' own request and against the advice of the medical staff concerned.

Yours, etc.,
D. C. JACKSON.

217 Wickham Terrace,
Brisbane,
March 28, 1951.

OIL AND THE STERILIZATION OF SYRINGES.

SIR: In Volume XIII (July, 1913) of the *Journal of Hygiene*, page 169, the following paragraph appears:

> Hot oil again is commonly made use of for the rapid sterilization of syringes employed in the inoculation of vaccines. The usual method is to draw oil heated to 140° C. in and out of the syringe which is then regarded as sterile. This is a procedure which only lasts for a fraction of a minute.

During my tenure of a scholarship at Oxford in the years 1910, 1911 and 1912, Professor Dreyer and Dr. Ainley Walker directed work by me at the Department of Pathology, University of Oxford, "on the resistance of spores to heating in anhydrous fluids such as glycerin and similar substances". The spores of *Bacillus subtilis* were used in the experiments.

Professor Dreyer and Dr. Ainley Walker (1912) were able to make a preliminary report on my work before its publication later (Bullock, 1913).

The conclusions arrived at were:

1. In the sterilization of glycerin (or oil) the use of the autoclave is without special value, since the exposure of spores suspended in glycerin (or oil) to superheated steam acts no more rapidly or effectively than simple heating of these fluids to the same temperature at the ordinary atmospheric pressure.

2. The heating of spores in glycerin (or oil) has no greater sterilizing action than simply heating them in dry air in the hot air sterilizer at the same temperature for the same period of time.

3. For the sterilization of these fluids it is necessary to use a temperature of not less than 170° C. for at least half an hour, or a temperature of 180° C. for not less than ten minutes to fifteen minutes.

4. The methods commonly in use for the sterilization of glycerin and similar fluids are quite inadequate to require sterility with certainty and accordingly they ought to be abandoned.

My reason for writing this letter is that last year Alexander Fleming in the *British Medical Journal* of August 5, 1950, advocated the sterilization of syringes by the use of oil at 130° C., and that K. B. Rogers, in *The Lancet* of July 20, 1946, advocated the use of oil at 130° C. to 135° C. for the same purpose. The use of oil for the sterilization of syringes is not without risk.

Yours, etc.,
HOWARD BULLOCK.

"Rolna",
155 Macquarie Street,
Sydney.
April 2, 1951.

References.

Bullock, Howard (1913), *Journal of Hygiene*, Volume XIII, page 168.

Dreyer, Georges, and Walker, E. W. Ainley (1912), *The Journal of Pathology and Bacteriology*, Volume XVII, page 142.

TETRAETHYL AMMONIUM CHLORIDE IN ARTHRITIS.

SIR: It seems to me that I should make a short comment on further experience with tetraethyl ammonium chloride in arthritis.

It was shown that any patient who has a hot swollen joint may expect some improvement; that this effect may be reversed if injections are given too frequently; that it is of no value in the "burnt-out" case; and that its greatest virtue is in checking "flare-ups" in the smouldering case, and in producing remission, even apparent cure, in the very early case where there has been no permanent structural change.

There is a great shortage of "Etamon", in South Australia at any rate, and I would suggest that, if the action is obtained through the action on sympathetic ganglia, then the hexamethammonium compound (hexathide) should prove an efficient substitute.

Further reading has indicated that these compounds should definitely not be used in the chronic asthmatic.

Yours, etc.,
CYRIL T. PIPER.

Shell House,
North Terrace,
Adelaide.
April 1, 1951.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course in Medical Mycology.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a full-time course in medical mycology will be conducted by Dr. Shirley LeV. Brown, B.Sc., in the Institute of Medical Research, Royal North Shore Hospital, beginning July 16, 1951. The course will be completed in two weeks, each of five working days,

from 10 a.m. to 4 p.m. As the course is essentially a practical one and individual tuition will be given, a maximum number of six candidates only will be accepted, preference being given to pathologists and dermatologists.

The following is a summary of the programme:

First Week.

Monday, July 16: A brief introduction. Botanical classification of fungi. A list of definitions of terms used in this branch of science, illustrated by slides, cultures and diagrams. A further discussion of some structures encountered, particularly appertaining to the classification.

Tuesday, July 17: A summary of fungi pathogenic to man—diseases and ætiological agents. A summary of the superficial mycoses in more detail and introduction to ringworm fungi. Epidermophyton and microsporon.

Wednesday, July 18: Trichophyton. Discussion of the fungi in detail with appropriate slides and cultures. Opportunity for students to make their own cultures. Very brief discussion of clinical aspects and treatment.

Thursday, July 19: Discussion of other cutaneous mycoses.

Friday, July 20: Revision of cutaneous mycoses; introduction to deep mycoses. A rapid review of the most important infections.

Second Week.

Monday, July 23: Deep mycoses. Detailed consideration of the fungi of the deep mycoses. Discussion of clinical aspects and treatment and of differential diagnosis in detail. Description of the following diseases: xeyptococcosis, blastomycosis, histoplasmosis, chromoblastomycosis.

Tuesday, July 24: Coccidioidomycosis. Paracoccidioides. Sporotrichosis. Mycetoma.

Wednesday, July 25: Actinomycosis. Discussion of other mycoses, deep and superficial, not previously mentioned.

Thursday, July 26: Brief discussion of common contaminant fungi; demonstration of cultures and culture-mounts.

Friday, July 27: Revision of superficial and deep fungi.

The fee for attendance will be £10 10s., payable in advance, and early enrolment is essential to the Course Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 5238, BW 7483.

Course in Advanced Medicine.

The Post-Graduate Committee in Medicine in the University of Sydney announces that a course in advanced medicine, suitable for candidates for the examination for membership of The Royal Australasian College of Physicians, will be held for a period of fifteen weeks beginning May 14, 1951. Fees for attendance will be £39 7s. 6d. or £2 12s. 6d. per week. The programme has been arranged to take place in the afternoons from Monday to Friday and on Saturday mornings.

It is desirable that candidates should have had considerable experience in clinical work either in hospital or medical practice before considering themselves prepared to take examinations for higher medical degrees or diplomas. The course will also be found of value to practitioners intending to devote further time to acquiring such experience before taking the examination and to those not seeking higher qualifications, but who are anxious to widen their knowledge of internal medicine. The scope of the course includes special instruction in electrocardiography; ward rounds and demonstrations of cases at the principal metropolitan hospitals; regular clinico-pathological conferences; lecture-demonstrations in pathology, hæmatology and biochemistry; demonstrations of the application of radiological methods of diagnosis to medical diseases; tutorials in case-taking; demonstrations and lectures in pædiatrics; demonstrations and lectures in psychiatry, and demonstrations of neurological cases and electroencephalography.

The supervisor of the course will conduct tutorials in selected subjects and will be available to discuss with students any problems arising in the course. It is expected that students will devote considerable time to reading of text-books and current medical literature.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 17, 1951.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[2]
Ankylostomiasis	*	..	..	..	..	..	..	..	..
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	2(2)	..	1	..	..	1	..	..	4
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	*	*	..	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	4(4)	..	10(7)	..	..	..	14
Diphtheria	19(2)	..	2(2)	..	3(2)	2(2)	..	..	26
Dysentery (Amœbic)	*	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	*	1	4(3)	..	..	..	..	..	5
Encephalitis Lethargica	1	..	..	..	..	..	..	..	1
Erysipelas	*	*	*	..	*	*	..	..	..
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	..	*	*	*	..
Hydatid	*	2	*	*	..	*	*	..	2
Influenza	*	*	*	..	*	*	..	*	..
Lead Poisoning	*	*	..	*	*	*	*	*	..
Leprosy	..	..	..	..	..	..	..	..	..
Malaria(*b*)	*	..	1(1)	..	..	..	..	..	1
Measles	*	*	*	38(5)	*	*	..	..	38
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	64(21)	10(5)	35(8)	25(6)	..	8(4)	..	..	142
Psittacosis	*	..	*	..	*	*	*	*	..
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella(*c*)	*	*	..	*	1(1)	*	..	..	1
Scarlet Fever	16(10)	12(7)	2(1)	5(2)	10(6)	..	..	2	47
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	..	2(2)	*	*	*	*	*	2
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(*d*)	21(18)	8(3)	10(8)	9(7)	11(8)	6(3)	..	..	65
Typhoid Fever(*e*)	..	..	..	1(1)	..	..	..	..	1
Typhus (Endemic)(*f*)	..	..	3	2(2)	..	..	..	..	5
Undulant Fever	..	1	..	..	..	..	..	..	1
Weil's Disease(*g*)	*	*	8	*	*	*	*	*	8
Whooping Cough	*	*	*	1(1)	*	*	..	..	1
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 37, 1946–1947. Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from the Northern Territory.
* Not notifiable.
(*a*) Includes Mossman and Sarina fevers. (*b*) Mainly relapses among servicemen infected overseas. (*c*) Notifiable disease in Queensland in females aged over fourteen years. (*d*) Includes all forms. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Includes scrub, murine and tick typhus. (*g*) Includes leptospiroses, Weil's and para-Weil's disease.

Fees are payable at enrolment date, and early application is desirable. Applications to attend whole or part of the course should be in the hands of the Course Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, not later than April 28, 1951. Telephones: BU 5238, BW 7483.

Obituary.

JOHN HAMILTON CRAWFORD.

WE regret to announce the death of Dr. John Hamilton Crawford, which occurred on April 3, 1951, at Brisbane.

HERBERT HAROLD SPENCER.

WE regret to announce the death of Dr. Herbert Harold Spencer, which occurred on March 29, 1951, at Queenscliffe, Victoria.

HAROLD ARTHUR MAUNDER.

WE regret to announce the death of Dr. Harold Arthur Maunder, which occurred on March 3, 1951, at Erith, Kent, England.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Wurth, William Geoffrey, M.B., B.S., 1951 (Univ. Sydney), 45 Olola Avenue, Vaucluse.

Campbell, Charles Haxton, M.B., B.S., 1950 (Univ. Sydney), Sydney Hospital, Macquarie Street, Sydney.

Bond, John Anthony, M.B., 1939, B.S., 1945 (Univ. Sydney), Royal Newcastle Hospital, Newcastle, New South Wales.

Garrett, William John, M.B., B.S., 1951 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Englebrecht, Robert Cecil, M.B., B.S., 1951 (Univ. Sydney), Ryde District Soldiers' Memorial Hospital, Eastwood.

Stackpool, Francis Michael, M.B., B.S., 1951 (Univ. Sydney), 3 Malvern Avenue, Chatswood.

Medical Appointments.

Dr. Anthony Richard Kevin Kelly has been appointed a member of the Nurses Board, pursuant to the provisions of Section 5 (3) (*a*) (i) of the *Nurses Act*, 1928, of Victoria.

Dr. Harry Kemple Byron Bailey has been appointed a member of the Police Medical Board, pursuant to the provisions of Section 7 of the *Police Regulation Act*, 1928, of Victoria.

Dr. Bernard Nicholson has been appointed Medical Superintendent at the Royal Adelaide Hospital, Adelaide, South Australia.

Dr. Francis Louis Dermot Young has been appointed Resident Medical Officer for Mental Institutions in South Australia.

Dr. Shirley Hilda Calder has been appointed registrar at Mareeba Babies' Hospital, South Australia.

Dr. B. G. Thomas has been appointed officer of health to the local board of health for the district of Barmera, South Australia.

Dr. W. T. Chalmers has been appointed officer of health for the district council area of Minalton, South Australia.

Dr. E. M. Nicholls has been appointed an inspector for the hundred of Curramulka, South Australia.

Dr. Robert Newman Nelson has been appointed Government Medical Officer at Ayr, Queensland.

Dr. Clive Henry Reynolds James has been appointed Government Medical Officer at Pomona, Queensland.

Diary for the Month.

APRIL 17.—New South Wales Branch, B.M.A.: Medical Politics Committee.
APRIL 18.—Western Australian Branch, B.M.A.: General Meeting.
APRIL 19.—New South Wales Branch, B.M.A.: Clinical Meeting.
APRIL 19.—Victorian Branch, B.M.A.: Executive Meeting.
APRIL 24.—New South Wales Branch, B.M.A.: Ethics Committee.
APRIL 25.—Victorian Branch, B.M.A.: Council Meeting.
APRIL 26.—New South Wales Branch, B.M.A.: Branch Meeting.
APRIL 26.—South Australian Branch, B.M.A.: Branch Meeting, Listerian Oration.
APRIL 27.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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